The MINING CONGRESS JOURNAL

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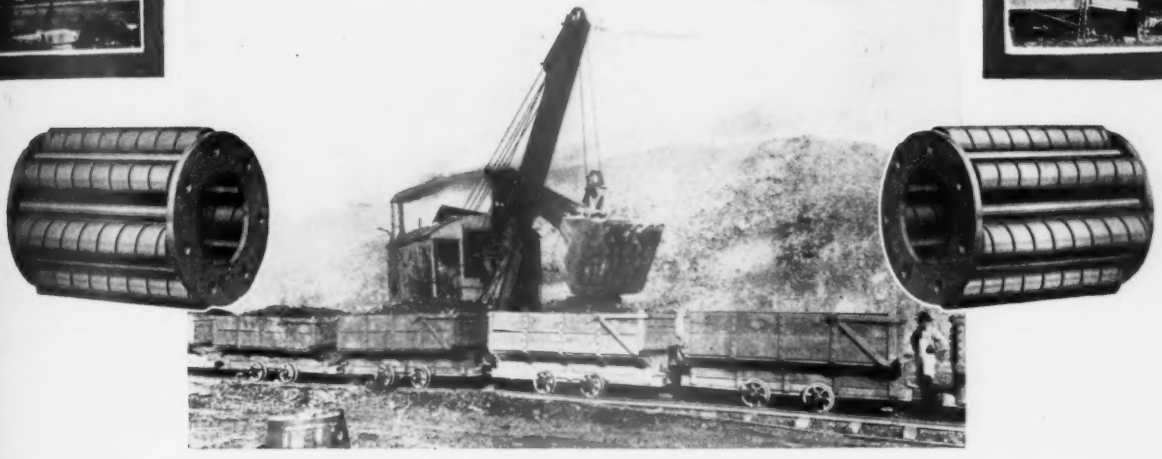

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Location: State.....County.....P. O.....

Pounds and type of explosives used annually (approx.).....

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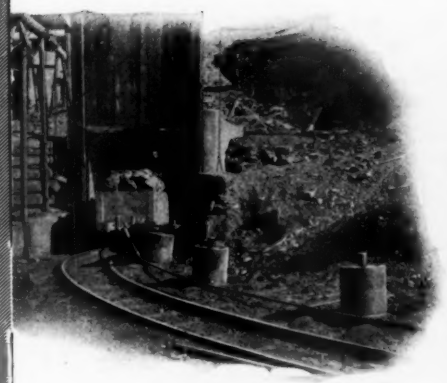

THE MINING CONGRESS JOURNAL

JUNE, 1925

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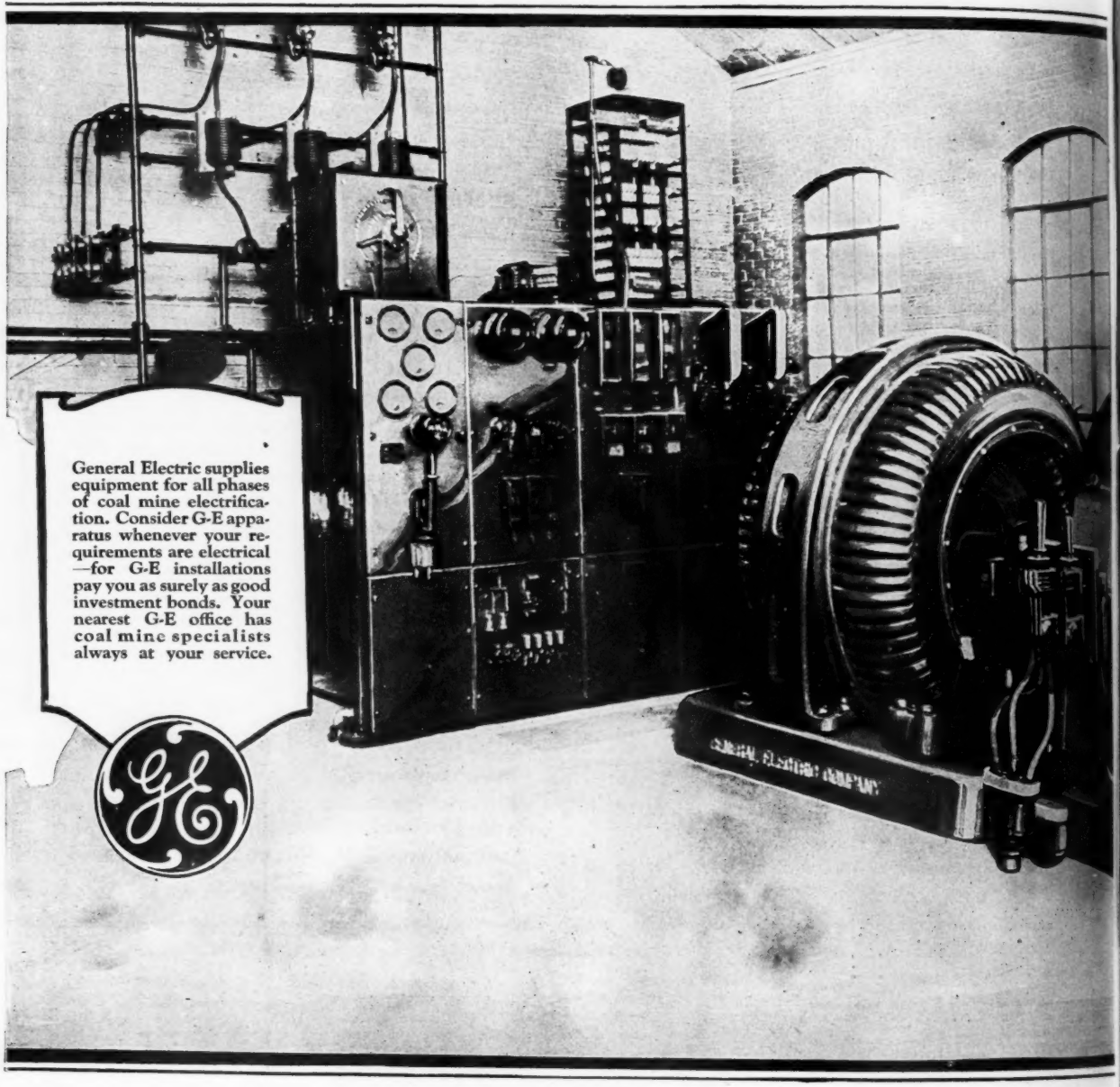

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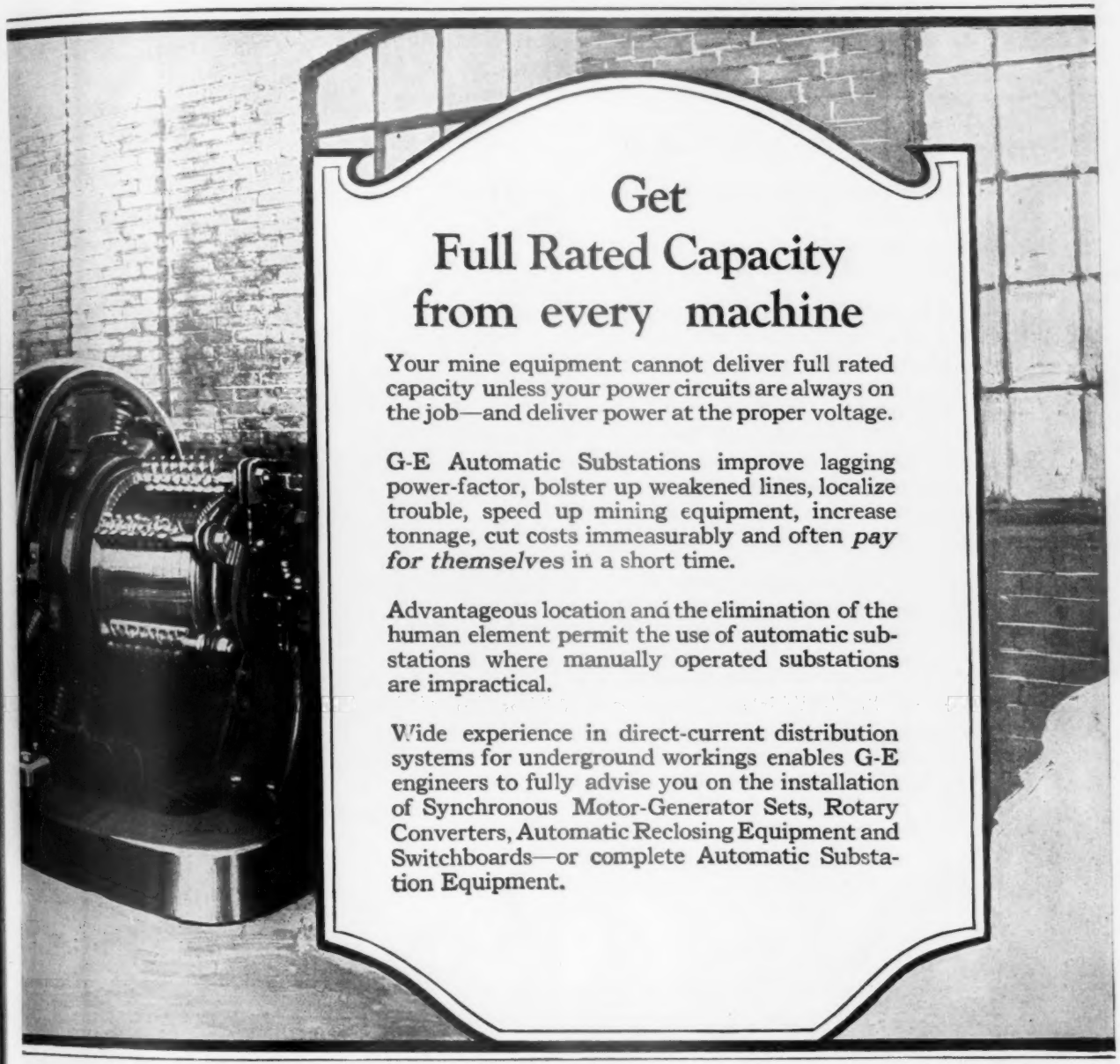

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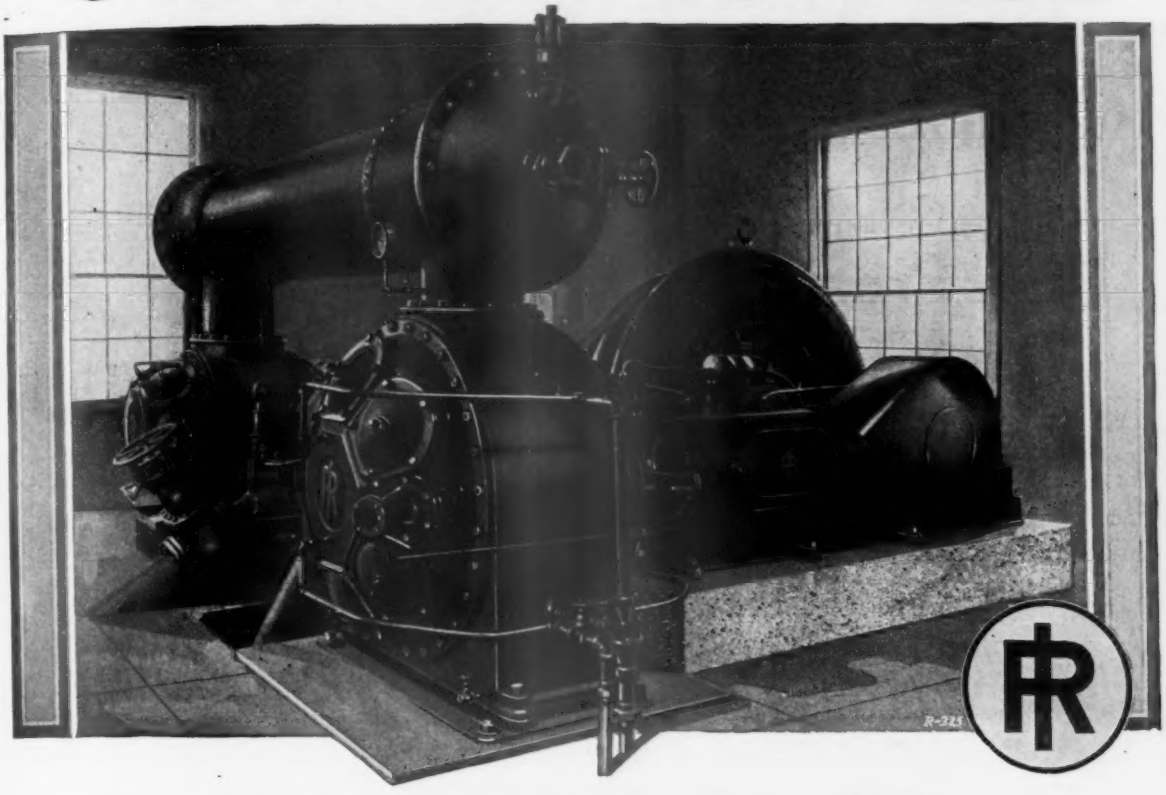

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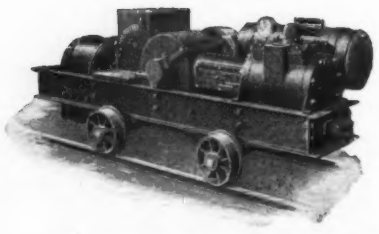

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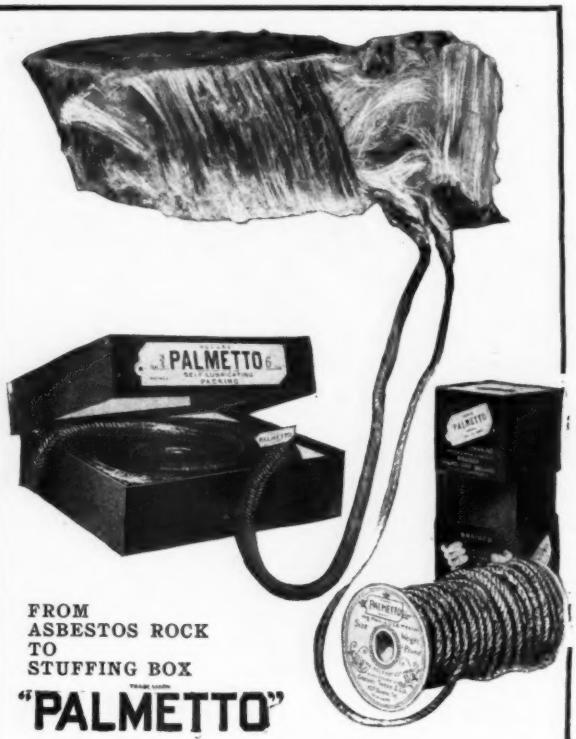

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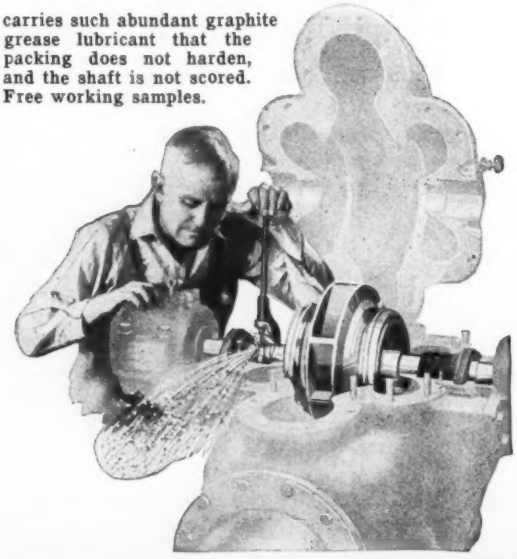

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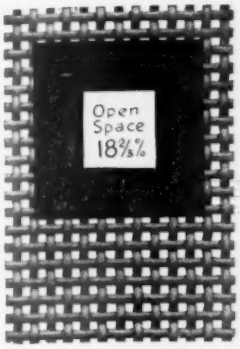

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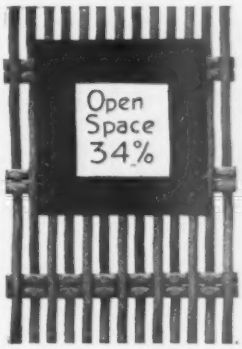

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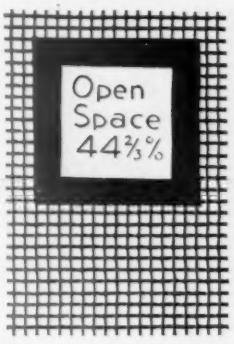

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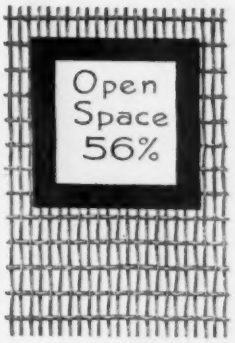

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.104	4.000	3½	13	.092	2.337	195	222	.45	2.35
.160	4.000	4½	21	.032	.813	30	34	.13	.60
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.1875	4.763		7	.177	4.496	600	694	1.10	
.1875	4.763		6	.192	4.877	650	741	1.70	
.187	4.750	2½	7	.177	4.496	500	675	1.30	6.00
.187	4.750	3½	11	.120	3.048	310	353	.58	2.65
.187	4.750	4	10	.053	1.600	100	114	.27	1.35
.187	4.750	4½	20	.035	.889	35	40	.14	.60
.185	4.699	3	9	.148	3.759	445	507	.75	3.00
.181	4.597	3½	12	.105	2.667	260	296	.55	2.00
.181	4.597	4½	19	.041	1.041	50	57	.18	.65
.178	4.521	4	15	.072	1.829	135	154	.35	1.75
.17717	4.5								
.177	4.496	5	24	.023	.584	17		.10	
.175	4.445	3½	13	.092	2.337	210	240	.45	2.50
.175	4.445	4½	18	.047	1.194	70	80	.22	.75
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.168	4.267	4½	17	.054	1.372	87	99	.25	1.05
.168	4.267	5	21	.032	.813	33	38	.14	.55
		3½	11			330		.22	
.130	3.302	4	11	.120	3.048	370	422	.75	4.50
.130	3.302	4½	13	.092	2.337	250	285	.60	3.35
.128	3.251	5	15	.072	1.829	168	192	.50	2.40
.128	3.251	5½	17	.054	1.372	105	120	.35	1.40
.12795	3.25								
.126	3.2	6	19	.041	1.041	65	74	.25	.85
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.125	3.175	7	26	.018	.457	15		.10	
.123	3.124	7	25	.020	.508	20		.11	
.120	3.048	5	14	.080	2.032	212	242	.55	2.75
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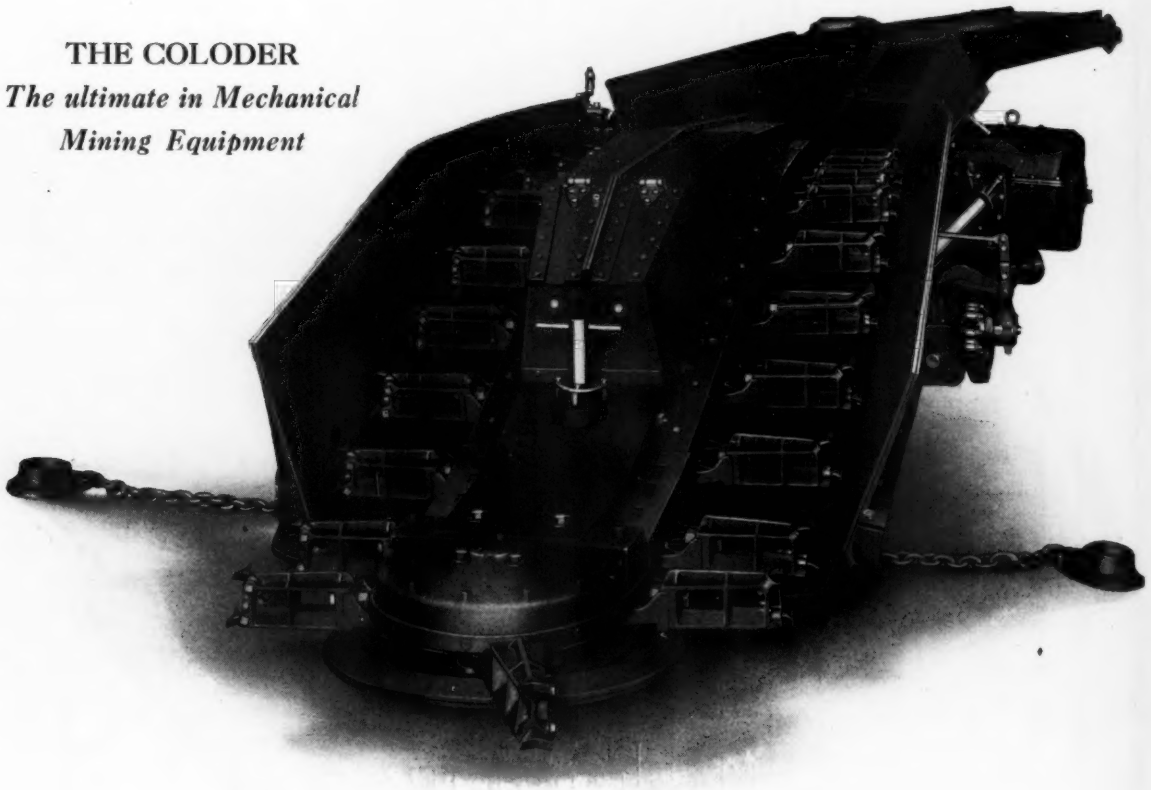

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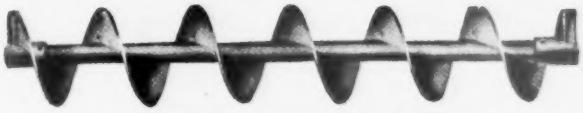

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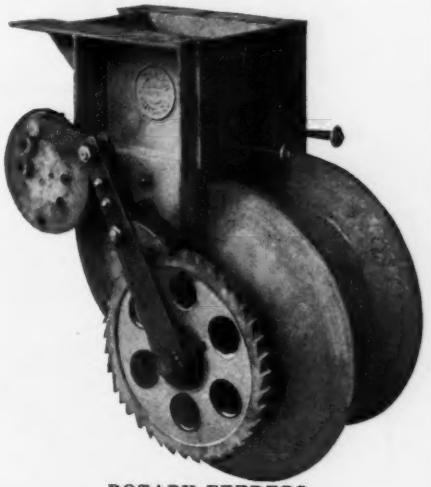

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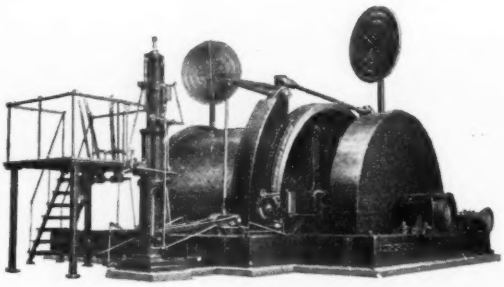

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OUR GREAT INDUSTRIAL NEED

NEVER before in the mining industry has there been such a need for complete understanding among those who employ and those who work. The major portion of the coal mining industry is closed down largely because workers and management cannot get together. The metal industry is more fortunate in its labor relations, largely because workers and management have found an avenue of approach to each other.

A statement was recently made at a public gathering of mining men that the thing that the paid organizer fears more than any other one thing is that the worker and the management may come to know each other too well. And there you have the nub of the entire industrial relations problem. Our great industrial system has crowded farther and farther apart the people who pay the wages, and the man who receives them. Capital has become symbolized in the minds of the worker according to the employment office tactics. It is perhaps an unpleasant, yet an undisputed fact, that in some districts the foreman is selected because of his ability to enforce his orders, instead of for his sympathetic qualities in dealing with his human problems. It was this type of subordinate that brought into existence the workers' union. And it is this type that perpetuates that union.

The Division of Industrial Cooperation of the American Mining Congress believes in the union principle. It has declared against organized workers banded together to fight organized or unorganized employers. It believes in organized workers and organized employers banded together for the mutual benefit of each other. An avenue that will in a more or less direct way bring together at a central point the viewpoint of those who work and those who employ. Whether a property is union or open shop, organized or unorganized, it is bound to fail in its industrial relations problem, unless there is provided an avenue which will permit the lowliest an opportunity to seek redress; and which will permit the highest executive an opportunity to tell his story to the men who are, with him, building an industry.

Destroying of the union will not solve the industrial relations problem. Complete domination of any industry by either capital or labor will not solve it. Unless there is a basis of understanding, unless men, high and low, understand that a full day's wage for a full day's work, and a full day's work for a full day's wage, is the only sound basis for any industry, there will be strife.

Our great industrial need in the mining industry is cooperation. And before true cooperation can be achieved we must have understanding of each other's needs. Industrial peace will not be reached through legislation, through compulsory arbitration or organized minority attempting to force its dictum. It can only be reached through an avenue that will give worker and operator alike the opportunity to gain first-hand information as to the needs of the other.

AT CINCINNATI

IT is a matter of vital importance, not only to the coal producer, but to the coal consumer, and the general public, that the problem of cutting costs in coal mining operations be solved as speedily as possible.

One phase of cost reduction was the subject of discussion for some 2,000 practical coal operating officials, at Cincinnati, during the week of May 25. This was, "Just how may coal costs be decreased, by mechanicalization of the mines?"

The major questions before these operators consisted of "Can we reduce our costs by installing loading machines?" "Will automatic control of mine equipment reduce costs?" "How can coal be shot to produce a larger percentage of lump?" "Will rock dust really prevent explosions, and what is its cost?" "How can we prolong the life of equipment after installation?" Practical coal men, working out these problems each day, discussed with each other their actual experiences.

Operators "got together" in an unprecedented manner at this meeting, and the industry as a whole may benefit therefrom. An expression heard about the convention most frequently was "this convention is the greatest thing that has ever happened to the coal industry"—and one operator in an address put it even more strongly when he said, "practical coal operating officials are not theorists; when they get together to discuss their problems the industry may confidently expect results."

The national exposition of mining equipment held in conjunction with the convention was a remarkable asset. One hundred and twenty-five manufacturers gave coal operators an opportunity to inspect, under one roof, practically every phase in the mechanical operation of a mine. They entered into the discussion of the operators' problems, and showed in every way their willingness to help solve production costs. Revolutionary changes in mining equipment have been made during recent years, and this exposition gave coal men a real opportunity to learn just what these changes are.

It was an interested meeting; a practical meeting; a helpful meeting. A spirit of thoughtful cooperation prevailed throughout. It is this spirit of cooperation, not only between the manufacturer and the operator, but between operators themselves, and between manufacturers themselves, that will solve the problems of the coal industry and enable it to keep pace with the progress of the nation.

THE VITAL DIFFERENCE

SOME statisticians who are constantly studying the coal business, have recently said that the average production a man a day, in the bituminous industry is 4.46 tons. A man in one of the Washington bureaus once said that any average figure about any phase of the coal business was about as important as would be the average temperature of all the patients in a hospital. We join that gentleman in his lack of confidence in any average figure, and in the belief that any proper deduction can be made from such a figure. Even though we cannot arrive at a truly scientific conclusion from such a figure, it does help to illustrate the difference between the union and the non-union wage scale which now governs in the coal fields. And, it does explain the difficulty which the union operator has when trying to compete successfully with a non-union operator.

That is to say, if the union miner produces 4.46 tons a day, and receives a minimum wage of $7.50, then the labor cost of production in the union field is $1.675. If, on the contrary, the non-union miner produces his 4.46 tons a day, and receives a wage of $4.50, the labor cost of production is, approximately, $1.00 a ton. The difference, therefore, between the union operator and the non-union operator is somewhere between 67 and 68 cents a ton, the union scale being the higher. It stands to reason that when the differential in freight rates seldom rises above 40 cents a ton, and when there remains, therefore, a minimum difference of between 27 and 28 cents a ton, the union operator is at distinct disadvantage in a market where even a contract is transferred from one producer to the other on as little as 3 cents a ton.

This figure, of course, is not conclusive because there are other differences in conditions which influence the cost. In the main, those differences are in favor of the non-union field. Not an insignificant factor is the fact that, by accident, the non-union coal is more accessible and cheaper to develop, while the more expensive mining conditions are found, in the main, in the union field. This only serves to increase the handicap of the union operator.

However, the big difference is in the attitude toward their work, assumed by the union miner on one side and the non-union on the other. This difference is that one group is sleeping on a contract. The other group knows that it holds the job only if it can satisfy the employer. The union group is disposed to shirk; the non-union group is disposed to work. The big difference, however, is what might be called phychological. That is, as a result of 30 years of unionization and of the impassioned appeals of the labor leaders, the union men have adopted an attitude of indifference, if not worse, toward the appeals of the operators for something approaching "a fair day's work for a fair day's pay." The men have been taught that such appeals are a mere attempt to exploit the workers. They have been taught that such things are deceptions and, in the main, untrue. They have been told that the operator is greedy and uses these appeals for the purpose of taking for himself something that belongs to the men. In consequence, there is not the slightest community of interest between the union miners and the operator, but, on the contrary, a decided division of interest. This, of course, is easily translatable into a vast difference in the cost of production.

It is not always possible to translate this into an actual number of cents a ton in the labor cost of production. But there is one part of it that can be so translated. In the notorious Jacksonville scale, there was set down a series of "rules and working conditions." They were the result of an accumulation through a period of 30 years. They were, mostly, an attempt on the part of the union to lessen the amount of work done by the men and to transfer an increased cost to the employer. One district in Ohio, believing that these conditions had intemperately increased the cost, moved to have them modified. The miners, recognizing that they were suffering from the competition of the non-union field and hoping to avoid a cut in wages, modified these rules and working conditions. The statisticians computed the influence of that change and found, according to a recent report, that it effected a difference in the cost of about 15 cents a ton. This seems to be a relatively small thing. But that actual cost has, also, to be modified by the fact that there is a difference in spirit of the two groups of men which may easily double that one item of expense. That is, if the two groups are working under identical conditions, and if one group is zealous and the other group is disposed to take life easy, it is entirely possible to add another 15 cents to the cost where the listless men work. That, in most cases, is just about what has happened. As will be seen by referring to the difference previously stated in the necessary price at the market, it is this additional 15 cents a ton which puts the union field out of competition with the non-union field. That comes nearer, we believe, to explaining the destructive influence of the union than anything which has appeared, so far.

It is tremendously important for even the union to understand this fact. It is true that the union movement has been headed toward the establishment of the principle that the worker has a vested right in his job. It very often has been pointed out that a vested right is of no value unless it is protected. If the union shall obtain the desired concession, namely, the acknowledgment that the worker has a vested right in his job, then the worker, in order to make that job good, must protect it. The facts just cited are rather conclusive on the point that the worker has not protected his job. Therefore, in the wage readjustment which is imminent, the matter to which most attention should be given is this one of putting the miner in a position where he will protect his job by helping the operator to reduce the labor cost of production, even though it be done without reducing the actual wage scale of the man himself. As Lloyd George would put it, if the men want to earn more, they must increase their efficiency; otherwise, the public must pay for the delinquency of the workers.

PRODUCING COAL MECHANICALLY

COAL MEN flocked in great numbers to Cincinnati, primarily for the purpose of discussing the possibilities of mechanicalization of their mines, and particularly to learn of the possibilities of mechanical loaders.

Stabilization of the coal mining industry has been a favorite subject for discussion by politicians, by theorists, and by those who believe they have the real remedy for the industry's ills. But the coal operator—the man who must do the stabilizing—has confined himself to effort, and not to talk, with the result that he is almost without exception agreeing that the biggest factor in bringing about a stable industry, is in producing his coal mechanically wherever it is possible to secure the equipment to meet his need. If the coal deposits were uniform, the problem of mechanical loaders would be a simple one. But nature has not been so prodigal.

There are thick seams and thin; shallow mines and deep; horizontal and sloping; individual conditions obtain in every district, and frequently in every mine.

One operator at Cincinnati made the statement that "In the past when a wave of depression has overtaken the coal industry, the difference between the lowest and highest cost properties were those incident to physical conditions, such as thickness and quality of seams, character of management, etc. We now have these same differences, accentuated by higher wage scales, plus the possibility of mechanicalization or non-mechanicalization. Therefore, we may assume that the producer who has the capital and courage to mechanicalize his properties, will be 'among those saved' and those who fail to do so, 'among those missing.'"

Most operators are sold on the possibilities of mechanical loading of coal. It remains largely a matter of securing the machine that will best meet the needs of the mine in question. A number of mines are attempting to solve this by inventing a machine fitted to their individual need. But there still remains in the union fields the question of the union, and the basis of wages to be paid the workers. In at least one field this question has been settled in what seems to be a satisfactory way. In Indiana in 1920 the operators entered into an agreement with the union, which is based upon the abolition of the piece work system, and the establishment of the day wage basis.

There are many things still to be worked out so far as the universal adoption of mechanical loaders is concerned. The first serious item is the cost of changing from hand to mechanically loaded coal; the second, the securing of a machine that will perform the service required at the property under consideration, and third, a satisfactory agreement with the workers who will handle the equipment.

The coal mining industry is over-developed and overmanned. One way to rid the industry of the latter situation is to transform capable men employed as laborers into operators of mechanical equipment, thus automatically reducing the number of men employed.

The Cincinnati meeting was worth thousands of dollars to the company either using or contemplating using loading machines, and it is hoped that the industry will make full use of the information revealed by the discussions which there took place.

FISHING HOOKS WITHDRAWN

THE income tax investigation is at an end. The Senate Committee discontinued its nosing activities on June 1. The investigation never should have been started. There was little justification for it. It has accomplished nothing worthy of note.

But it has disrupted the administrative organization of the Bureau of Internal Revenue. It has damaged taxpayers. It has been expensive to the government. The committee's report will be biased and one-sided, and will be based upon the misleading testimony and unfair reports of committee agents.

The investigation disclosed no fraud. Alleged irregularities were merely matters concerning which the opinions of honest men may differ without violation of any principle of the moral code. No graft or corruption was uncovered.

In fact, no one who knows anything at all about the income tax unit and the character of its employes expected the committee to find anything wrong, except, possibly, in some isolated instances. Among the 10,000 employes of the Revenue Bureau, it was not humanly possible that all should be perfect, or make perfect records.

The results of the investigation are deplorable. For more than a year the income tax unit has been unable to function properly. The work of settling war-tax cases is farther behind than ever. And hundreds of closed cases have been arbitrarily reopened for no other purpose, apparently, than to satisfy the investigating committee.

The taxpayer suffers. Besides paying for a needless investigation, the taxpayer has had his settlements delayed, his business transactions have been held up, and he has been compelled to employ counsel at great expense to conduct the rehearings of his case.

Whether or not the taxpayer is damaged further depends on what Congress does with the report of the investigation. If the report is taken seriously, and if the statements it presumably will contain are regarded as facts, the taxpayer will have to have an opportunity to tell his side of the story to the Ways and Means of the House and the Finance Committee of the Senate.

The income tax unit, however, should get down to business, now that the interference has been withdrawn. Those old cases should be closed. If the unit four or five years ago made mistakes, it should not now harass and tie up business in order to correct them.

THE MINING CONGRESS JOURNAL has been entirely out of sympathy with the tax investigation from the beginning. It should not have been authorized. It was the opinion of this Journal that it should have been stopped on March 3 by Senate action. Now, although the probe is at an end, this Journal is of the opinion that this business will not be settled until Congress squelches those who instigated it in the first place.

AN UNHEALTHY CONDITION

THE mind of the public is a paradox. A bank-robber blows up a bank, and the public cries for his apprehension and punishment. A dynamiter blows up a coal tipple, and the public either assumes a neutral attitude or sympathizes with the dynamiter.

What makes the difference? The owner of the bank has public sympathy and support as well as the full benefit of government police protection. The owner of the coal tipple not only lacks public sympathy but frequently is denied proper police protection, and if he employs private guards to protect his property, he is censured.

The owner of the bank may not be public-spirited in any sense of the word. He may be a hard-boiled, close-fisted tight-wad in his relations with the public. The owner of the coal tipple, on the other hand, may be a fine, patriotic, charitable, public-spirited citizen. Nevertheless, the public will deplore the looting of the bank and secretly exult over the destruction of the tipple.

The owner of the bank can suffer no material loss because the bank and the contents of its vault are insured. The owner of the tipple may be forced into bankruptcy by reason of the loss of the tipple. All the police forces of the nation cooperate in the hunt for a bank-looter; if apprehended, he must expect no mercy from the public, the courts, or the jury; but the dynamiter may never be caught, and if caught, has an even chance, at least, for acquittal by a jury of his peers, and this is frequently true in the case of the tipple dynamiter who has at the same time committed murder.

It is this condition of the public mind that encour-

ages radicals to go to extremes such as the Herrin massacre, to say nothing of the lawless acts committed by radicals in the West Virginia coal fields. It is this condition of the public mind that must be corrected. The condition is dangerous, not only for the people themselves but for the welfare of their government and their country.

The dynamiting of a tipple and the wanton murder of the guards who watch over it are just as horrible as the looting of a bank and the heartless killing of the watchman who guards its vault. Who can disagree with this proposition? Will any thinking citizen? Then let the public—all loyal citizens of this country—insist upon merciless pursuit and apprehension and punishment of all murderers and dynamiters, whether their victims were the owners and employes of a bank, the owners and employes of a coal company, or the officers and guardians of law and order.

THE IMPERATIVE NEED

THE gentlemen who are trying to conduct the coal business have found themselves in a most trying position in recent months. It is not necessary to trace the complex causes of their dilemna because all of them are known and have been described. It is enough to say that, as a resultant of all these forces, one of the most important industries of this nation finds itself in a position where it seems well nigh impossible to maintain a company in a solvent position. Men who are thus struggling with the most difficult situation in the life of any individual are in no position to think consecutively or to plan a way out of their distress. They are so hedged about by their own difficulties and alarms that they can see nothing but the immediate danger. Thus the industry is sinking deeper and deeper into disorder while the men are becoming more and more panic stricken. And, as the coal industry goes down, it, of necessity, drags other industries down with it.

It is obvious that something must be done to reverse a condition so destructive of the economic life of the nation. And when that "something" is done, it must strike to the very root of the whole matter and remove the most potent of the causes. But, when an effort is made to penetrate the labyrinth to find what is the real trouble, it is necessary to take, briefly, into account the known causes of this demoralization.

Even a casual reading of the newspaper headlines for the last 25 years will show the principal difficulty in coal. Those headlines and cartoons have referred with alarming frequency to "the coal trust," the "coal baron," the "coal monopoly" and what not. The people have had to use coal as an ally against winter. They have had to resort to one distasteful thing to avoid the annoyances of another. They wanted to get out of that experience with as little expense as possible. But, when the turn of the market went, ever so slightly against them, the people, naturally, complained. The instant the people complained, the county prosecutors and the newspapers took up the cry. Thus we had the wildest sort of charges and recriminations which came to a focus in the headlines about the various subjects mentioned. On the one side, we had a group of men pursuing an ordinary business with its ordinary market fluctuations and difficulties. On the other side, we had a system of espionage based on suspicion which has been unparalleled in the history of any country. And, in the background, we had demagogues who have kept this spirit alive through the years. It has been a most amazing case of a friendly industry practically kept at war with the people by unscrupulous misrepresentation.

At various times, those who have been animated by the highest of motives have stepped into the public arena to make suggestions to coal. They have seen the obvious disorganization of the industry. They have suggested the obvious "cooperation." And, in their innocence, they have believed that making the suggestion and carrying it into effect were both simultaneous and easy. But, the coal man, with the other picture in the back of his head, has never been able to see the thing in practical operation. He has seen that the first effort to carry the project into effect, would start every prosecuting attorney of every county in the land into action and every newspaper in every cross-roads town barking at the heels of the attorney. The recommendation has sounded good, but the project itself was far from yielding a promising outcome.

The coal men hoped—almost against hope—that the appointment by the president of a coal commission and the findings of that body would bring to light the facts which would, for a few years at least, stop this hue and cry. In this one hope they were bitterly disappointed.

The present depression in the industry is the direct but accumulated result of disorganization largely attributable to the heckling to which this industry has been subjected. What the industry lacks is confidence that it is going to get a square deal in the business world. A foundation upon which that industry can rebuild, is the restoration of that confidence. The industry does not ask and never has asked that any of the laws of the land shall be repealed or winked at. It has never asked that it be allowed to conduct a combination in restraint of trade; it does not now ask it. But, it does ask and it should have a clear and clean cut definition of the line between constructive organization and law violation.

It is not the purpose of this editorial to put anything "up to" the attorney general. But, it is suggested, with all proper deference, that a clear cut outline of the policy of his department—binding upon all of his employes—might be especially encouraging to the forces of good and clean business in coal.

THE GOAL

THE Manufacturers Division of The American Mining Congress is no longer an experiment. It has "delivered the goods" twice, in succession. Last year, at Cincinnati, it staged its exposition on faith. Some 1,700 practical operating officials justified that faith. This year, again at Cincinnati, there were in attendance more than 2,000 practical coal operating officials.

The exposition housed under one roof 125 exhibits of the leading manufacturers of mining equipment in this country, and included exhibits from foreign countries. The industry feels that these expositions and conventions fill a long felt need. Many companies publically announced that while they had sent a large delegation of their operating men to the meeting this year, next year they would send an even larger delegation, because they believe the expenditure of money in this manner is of the greatest value to them.

Originally the Manufacturers Division was a small group of manufacturers who had vision and the courage to carry out their convictions. Today the division is composed of the leading manufacturers of mining equipment in the United States. It is growing in strength and its possibilities are a distinct credit to that far sighted group who believed in cooperative effort.

EMPLOYES COMMITTEE PLAN OF THE UTAH COPPER COMPANY

Plan Affords Every Employe Opportunity To Present Any Suggestion Or Complaint And Have It Promptly Considered—It Emphasizes Importance Of Mutual Confidence And Is Designed To Insure Cooperation Between Men And Management

By Louis S. Cates *

FOR many years past, the management of the Utah Copper Company has been engaged in working out a plan to maintain the pleasant relations existing, and to establish closer relations between the employes and the management. With that object in view, the management offered to the employes a plan of representation under which each wage earner in the employ of the company would be entitled to participate in an election, by secret ballot, of representatives to be chosen from among his fellow workmen. The representatives constitute a committee to consult with the managing and superintending officials on subjects of mutual interest, and are the accredited representatives of the employes. The plan in detail affords every employe the right to present any suggestion, request or complaint and have it promptly considered and fairly decided. The spirit of the plan is a belief in the importance and efficacy of mutual confidence and consideration designed to secure and ensure hearty cooperation between the men and the management. Its fundamental principle is direct dealing between the management and representatives elected by the workmen from among their own numbers. It is the representative principle of democracy applied to industrial relations. The committee plan affords ample opportunity to talk matters over and enables adjustments to be made quickly and satisfactorily.

The plan first creates certain departmental divisions and assigns a prescribed number of representatives to each division corresponding to the importance of the division and the number of men normally employed in that division. The divisions at the mills are as follows: (a) Operation, including shift men working in the following departments: Coarse crushing, fine crushing, concentrating, floatation, de-watering and oiling; (b) repairs, including all repairmen and riggers working in the departments enumerated under division (a); (c) shops, including machine, boiler and blacksmith, tin, paint, carpenter and pipe shops, also garage men and electricians; (d) foundry, including foundry men only; (e) construction, including men working regularly on new construction; (f) general, including samplers, yard, time, office and general; (g) office, including all men employed in the general office; (h) foreign, including all Greeks and Japanese working in or about the plant. The divisions at the mine are as follows: (1) Shovel engineers, cranemen and firemen; (2) locomotive engineers, firemen, brakemen and yardmen; (3) machine shop and bull gang; (4) electrical, water service and carpenter departments; (5) drilling and blasting; (6) Greek pitmen, coalmen, dumpmen and trackmen; (7) Japanese pitmen, coalmen, dumpmen and trackmen; (8) clerical and engineering departments.

Continuing, the plan provides for and covers the following subject matters:

Selection of Representatives: Departmental representatives shall be elected by ballot by department employes at elections which will be held semi-annually at the plant time office. A joint committee of six, three representing the employes and three representing the management, shall count the ballots and post the results of the elections.

Qualifications of Voters and Candidates: After the first election the qualification for voters and candidates shall consist of continuous employment by the company for at least six months. A list of those eligible as candidates or voters shall be posted by the company two weeks before the election.

Term of Representatives: At the first election the candidate or candidates receiving the highest number of votes will be declared elected. In those departments having two representatives, or more, the one receiving the highest number of votes shall hold office for one year, while in those departments having one representative, the term of office shall be six months. In case of a tie vote the candidate who has been longest in the service of the company shall be declared elected.

Compensation: The company will pay, at regular hourly rates, all employes representatives who attend general committee meetings during working hours and for all meetings attended after working hours the representatives shall receive $2.00 each.

General Committee: The general committee shall consist of the elected representatives of all the departments and shall elect its own chairman and secretary and adopt its own rules, including penalties for nonattendance at meetings. Two-thirds of the entire membership of the general committee shall constitute a quorum.

Meetings of General Committee: The general committee shall hold two meetings each month, one of which meetings is to be held with representatives of the management.

Vacancies: All vacancies on the general committee shall be filled at a special election to be held by the department in which the vacancy occurs, such election being arranged for by two members of the general committee appointed by the chairman and two others chosen by the management. Transfer of representatives from one department to another shall create a vacancy to be filled as above provided.

Complaints: In the event of any misunderstanding the complainant shall report the matter to the representatives or representative of his department who, with reasonable promptness, shall confer with the foreman of that department. Should no satisfactory settlement be arrived at, then the representative or representatives shall take the question up to the superintendent and if no settlement is reached at this conference, the question shall be submitted at a meeting of the general committee with representatives of the management, at which time a written statement shall be presented reciting causes for complaint. If no satisfactory settlement is reached as a result of the hearing before the general committee above mentioned, a special meeting may be called, before which additional material facts and evidence in writing may be presented.

Communications to the Company: All communications from the general committee to the company shall be addressed to the superintendent with copies to the general manager, assistant manager and consulting engineer of mills.

Posting Copies of Minutes: Discussions and decisions of the general committee and the management shall be embodied in the minutes of the meeting and copies of the minutes posted on bulletin boards.

The plan as submitted to and accepted by the employes closed with the statement that "it is believed that the arrangements outlined will provide a satisfactory method for the settlement of misunderstandings as they arise and all complainants are urged and expected to present their cases through proper channels in order that an early settlement may be reached."

*Vice-President and General Manager, Utah Copper Co.; President, The American Mining Congress.

JOINT REPRESENTATION COLORADO FUEL AND IRON COMPANY

The Recent Report On The Plan In Force At The Properties Of The C. F. & I. By The Russell Sage Foundation Has Caused General Discussion Of The Whole Question Of Industrial Relations—This Article Fully Outlines Their Plan

By A. H. LICHTY*

THE Colorado Fuel and Iron Company operates iron mines, limestone quarries, coal mines, a railroad and a steel plant. These operations are distributed over 25 different communities in the states of Colorado and Wyoming. We market coal, coke, coke by-products and finished steel, such as rails, merchant bars, woven wire fence, wire, nails, staples and many other kinds of wire products.

Normally, we employ from 10,000 to 12,000 workers.

These employees represent 54 nationalities, according to the basis used by other companies similar to ours in preparing statistics.

Joint representation has been at work among the properties of our company since October, 1915.

We inaugurated it in order to provide a means of contact between the employees and the officers of the company, in all matters pertaining to working and living conditions, that would insure fair dealing constantly; secure cooperative action; eliminate, so far as possible, the causes of contention and thus bring about feelings of mutual confidence.

Our company was much interested in developing machinery for handling relations between employes and employer that would effectively prevent discrimination. We wanted to insure the maximum certainty that employes would not be discharged without just cause, or a chance to have their cases reviewed upon their merits—thus giving the greatest possible assurance of the security of a man's job.

We earnestly desired to make more certain than ever before, that reason and the spirit of fair play rather than passion and prejudice would control the consideration of all questions, and that it would be possible for employes to readily reach the highest officials of management with respect to all matters on which they might be interested, and to have them so understand. We believed that such an arrangement would better enable both the employes and the management to realize that they are all working for the same purpose, namely—to make the industry in which they are partners, a success, because it would mean more continuous operation at the different plants and less interruption in the employment of workers.

We adopted joint representation in the following manner:

It was tentatively submitted by management to representatives of employes who had been previously elected, and to the directors of the company, for discussion. After approval by both of these bodies, it was submitted to all of our employes at each operation and ratified by a vote of the employes.

Professor Taussig, of Harvard, says: "The aims and purposes of our clearing house system in our banking arrangement is doubtless somewhat vague and not clearly defined as to purpose and method to many who are responsible for operating it." Likewise, it is entirely possible that the ideals and objectives of joint representation are somewhat vague and not clearly defined as to purpose and method, to some of those who are responsible for operating it.

That the primary objectives of joint representation, however, have gradually become clear to the employes and to local management is evidenced in part by the following quotations from them which are quite typical of what we hear frequently from many men.

An employes representative states as its purpose:

"To bring employes and management together, and, through conference and discussion, into a better understanding of each other."

Another says:

"To help employes and management, through experience, learn that they can depend upon each other to do what is just and fair."

A representative of management states it this way:

"To help insure both employes and management that whenever grievances arise, whether real or imaginary, they will be adjusted without condemnation or discrimination—a fair deal both ways, from the management towards the employes and vice versa—a guarantee of non-conflicting relationships.

Another representative from the same group says:

"To impress the wage earner that he is not only an employe but a necessary and important part of the organization as well."

And still another:

"A means for conveying to employes the problems of management, such as those relating to costs and others of a similar nature and of mutual interest."

No method of handling human relationship questions will operate automatically. Every method will need attention and direction constantly, just the same as the business of a company needs a manager constantly.

As experience widens with a given labor policy, weaknesses and difficulties will develop from time to time, and these merit the most thoughtful and sympathetic consideration, if the labor policy is to prove increasingly successful and satisfactory to all concerned.

Joint representation within our company is no exception in these particulars.

OPERATING OFFICIALS COOPERATION IS ESSENTIAL TO SUCCESSFUL RESULTS

To make joint representation effective, the plant manager must be willing to devote time to its operation. It also requires an endless amount of patience. This cannot well be avoided, even where a Department of Industrial Relations, having general direction of the work, exists.

Among developments which are worth noting and some of the conclusions reached, are the following:

It is quite generally conceded by both employes and management that if the aims and purposes of joint representation, as it now stands, are sincerely carried out by both management and employes, nothing but success and mutual benefit and satisfaction can result.

SINCERITY AND PROMPTNESS NECESSARY IN MAKING ADJUSTMENTS

Said a superintendent:

"To make joint representation a success, all grievances and complaints should be treated with sincerity and dispatch by both employes and management. Nothing so quickly discourages an employe as needless delay in securing the adjustment of a case. To him it always seems one of importance. Delay means the loss of confidence of the employes and spells defeat of joint representation."

This same view was expressed by an employe representative:

"Thoroughness in securing data and right spirit on the part of the management and the rest of the employes is highly important. Delay or evasion, or a spirit of unfairness here, not only affects the confidence of employes in joint representation but sometimes causes small matters to become important trouble makers."

Quoting a superintendent:

"Management of industry generally

*Vice-President, Colorado Fuel & Iron Co.

has been so long in control that it fears to relinquish anything which will hamper it in the exercise of this control, and it looks with suspicion upon any change which might so hamper it.

"More or less resentment on the part of some members of management is very natural for the type of men who always ruled arbitrarily and who never granted the privilege of frank and open discussion regarding matters of mutual interest to employes and management. Much patience and sympathetic effort is due them, but if in time they cannot and will not measure up, they must be replaced.

"Constant vigilance is necessary for the most satisfactory results."

Quoting an employes representative:

"Small bosses sometimes show favoritism and hold revenge against employes representatives and others who may become active in bringing up questions. Such men are sometimes slowly reduced in rank until they become discouraged and refuse to work as representatives. Their stories when told to the employes break down confidence in joint representation."

"Out of the desire to give the employees a fair deal one should be careful to not go too far and thereby injure discipline," says an experienced representative of management.

A superintendent says:

"Employes seeing so many things so long denied them which they want for themselves are sometimes inclined to try to secure everything they can get irrespective of the results to the business which employs them. This is not wholly unnatural. It is simply a trait of human nature. That representatives of management locally, even the superintendents, are thoroughly human must never be lost sight of. They may err in judgment at times, and it is, of course, possible that some of them may do some things that are small and decidedly disturbing and disappointing."

Quoting a superintendent: "Experience has taught us that under joint representation there need be no interference in operation while adjustment of grievances is being made."

We have repeatedly been reminded of the fact that it is necessary for management to be a good listener, no matter how trivial a complaint or grievance may seem.

Said an experienced employes representative: "After prompt discussion by employes representatives and management, of such questions as the reduction of working forces, or wages, or others of a similar nature, the representatives take the proposal to the employes concerned. These are always accepted with better grace than if a notice is posted without discussion stating the acts in which the employes representatives did not share."

A representative of management reminds us that:

"Joint representation in order to win must have the whole-hearted support of management and not simply be used as a means of avoiding a conflict with labor unions."

Another man from the same group has offered this comment:

"The success or failure of joint representation depends upon the spirit of management."

Industrial cooperation in the Black Hills metal mining region of South Dakota has settled down to a better understanding between operators and men. All the uplift schemes and plans are of little avail when there is distrust and suspicion present. The companies are treating their men with all the consideration possible as working parts of the corporations and in return the men are doing a better day's work than ever before. The days of unrest following the war are over. All the cooperation in the world will not overcome distrust and shirking when the men feel that they are not being treated honestly and squarely.

Safety work has been another plank on which both sides have united and are working harmoniously together. The men feel that the efforts of the companies along these lines is honestly intended for their benefit and they in turn are lending every effort to further the work.

Any mutual plan bringing the men and officials together for consultations clears the industrial atmosphere.

E. F. IRWIN,
Homestake Mining Company.

Right Experience Will Ultimately Develop Confidence

Employes representatives should be constantly urged to take up cases with the men on the ground. Cases so taken up and adjusted will develop confidence in the local management.

Said an employes representative, formerly an active organized labor worker:

"In our field the employes themselves did not at first take enough interest in joint representation. However, within the last few years here, men have seen that the company means business. They learned this through the grievances that have been settled, and they are now taking more interest in joint representation."

The right spirit of management consistently and persistently shown will ultimately win the confidence of the employes.

Helpful Cooperation Merited by Newly Elected Representatives

The task of the employes representative is a difficult one, and both the management and the representatives, realizing this, should sympathetically cooperate in developing and maintaining the dignity of the position.

It is very easy for higher officials to dishearten other workers by seemingly thoughtless action or expression and a lack of interest or of confidence.

A wage earner offers this helpful caution:

"We must guard against the plant manager or any other one of any committee or in any conference domineering the entire situation, voting the whole group whom he represents."

We must constantly improve the efficiency of joint representation or else we shall fail to rightly educate the younger and incoming employes, and thus prevent progress in joint representation, even after the present generation of both employes and management shall have passed.

Quoting a representative of management:

"We must keep in mind that the interests of both the employes and the company, as a whole, should be benefitted by joint representation. Lack of prosperity of the employer must surely mean uncertainty to the employe. In the long run, its economic worth, as well as its human side, must be established."

Regarding Results

"We have yet to determine a satisfactory standard for measuring accurately the value of the service rendered in the world by religion, by our public schools, our colleges, or by even the good roads movement." This is also more or less true regarding a suitable standard for measuring the value of the results from joint representation. However, the following statements have been made regarding results by men of experience in joint representation within our company:

Says an employes representative:

"Joint representation has stopped one man's decision from becoming law, because if the parties concerned are not satisfied, the case is taken up until it is settled fairly."

A similar opinion is voiced by a representative of management:

"Every employe under joint representation is insured of a hearing regardless of the merits of his case."

Quoting another employes representative:

"One of the greatest benefits through

Joint Representation is that employes cannot be unjustly discharged at will by their superiors. This takes away that ever-lurking fear and dread that haunt men who depend upon a daily wage for a living and who work where their jobs are at the mercy of a whimsical, tyrannical boss. Bereft of this fear, an employe can feel that the job is his today, tomorrow and the next day, provided he takes proper care of it and he will have the courage to do it at his best. The working man's biggest concern is his job. A steady job means, among other things, food, clothing and a home, a savings account, an education for the children, and some pleasures for the whole family."

A superintendent makes this observation:

"Joint representation has brought the employes and employer into a closer working relationship, and has stimulated better acquaintance and better understanding.

"It also has brought our employes better working conditions, better living conditions, a chance to educate themselves in every way, and they are steadier on the job."

Another representative of management adds:

"Through joint representation our company has established communities that are a pleasure to live in. They are clean and orderly, and employes have advantages for themselves and their children that are not surpassed by larger manufacturing and agricultural towns of the state. All this is at a less cost and with less effort on the part of the employes than in any other community that I know of.

"Matters pertaining to health, prevention of accidents, improved working conditions, and others of a similar nature, have all been changed for the better, and I think joint representation has played a very important part in the improvement. These conditions have brought about a situation that makes it desirable to seek employment in the service of the Colorado Fuel and Iron Company. I am sure that in a general way, the employes have responded to the better understanding between employer and employe, and that they do appreciate the fact that it is a privilege to be associated with such an organization."

Quoting an employes representative:

"There is evidence of progress in that employes and employer are coming to feel they can always depend upon a square deal from each other."

It is of large value to any industrial organization for the management to receive all of the most helpful suggestions and the most constructive criticisms that the employes as well as the management are capable of making. To the extent such cooperation is withheld, progress is retarded. Such assistance comes forward far more readily as the spirit of mutual confidence and fair dealing becomes a constant reality. Quoting a superintendent:

"Constructive criticism and suggestions are now made. Before we had joint representation these were withheld—or, if offered, they were often not received in the right spirit by management."

A former active worker in organized labor who has also had some years of experience as an employes representative under joint representation, says:

"Questions of highly significant importance as well as those of minor importance can be adjusted under joint representation to the entire satisfaction of all concerned. For example—our wage reductions in 1921, and the adoption of the 8-hour day in the steel works in November, 1918."

General Summary

For more than eight years every question arising between the employes and management in our company has been adjusted by peaceful and harmonious methods to the general satisfaction of those concerned.

In the one important case carried to the State Industrial Commission in which the Commission assumed jurisdiction and which related to a wage adjustment, negotiated between the employes and the management, the Commission, after careful investigation, approved the decision that was first proposed within our organization.

More and more the question arising between the employes and the local management are adjusted at their source.

It is clearly the responsibility of those who serve in the more important positions of management to make certain that the attitude of the foremen and superintendents towards joint representation is right and as nearly uniform as possible.

Rather than have a highly centralized Industrial Relations Department, we believe that responsibility for the carrying out of the purposes of joint representation should be recognized as a legitimate part of the regular duties of every operating official—from the president of the company out to the least important straw boss.

Management has the responsibility for taking the initiative in developing increasingly right relations within its organization. When this is done, almost invariably a very satisfactory response will come from the employes. The right thing persistently done in the right spirit will sooner or later surely bring the desired results.

Sixty percent of all the men hired at our steel works last year had previously served in the employ of our company.

Instead of having labor shortage our company has had a constant surplus. Except during the peak of the war demands, we have had no labor shortage since long before the World War.

The Colorado Fuel and Iron Company, therefore, advocates a system which provides joint representation of employes and management for the conduct of relationships between those parties in industry.

Under such a system, joint conferences should cover all questions whether of mutual interest or of apparently peculiar interest to either of the parties concerned. Experience with such a system will demonstrate that generally questions which might at first appear to be of interest to one side only are really of mutual concern.

There is inestimable value in frequent conferences between the representatives of employes and management because they naturally develop better acquaintance and understanding of each other's points of view and problems, the result being increasing mutual confidence.

Having thus established mutual confidence in dealing with ordinary matters, cases of serious importance, when arising, are more readily adjusted with a minimum of friction.

No reform movement, when put to the test, has proven 100 percent effective in so short a time—a period of less than 10 years. Christianity has been at work in the world approximately two thousand years. No one who is acquainted with the facts and is truthful will say that it is a failure; and yet, after it has been actively at work for nearly two thousand years, we all recognize that it is by no means perfect.

Likewise, we recognize that joint representation is by no means 100 percent efficient. It must be operated by men on both sides who are thoroughly human—sometimes selfish and inconsiderate. We face new and sometimes difficult problems as our experience widens. However, we have found that none of these are impossible of solution. We are greatly encouraged by the progress made. We have a steadily growing confidence in the underlying principles of our plan; we believe they face in the right direction and that the future of joint representation is one of large promise for all concerned.

INDUSTRIAL COOPERATION AT THE COPPER QUEEN BRANCH OF THE PHELPS DODGE CORPORATION

This Company Has No Sentimental Or Paternalistic Illusions In The Handling Of Its Labor Problems—It Has Always Realized That It Is To The Company's Advantage To Have The Interest, Good Will And Cooperation Of Its Employes

By H. C. Henrie *

THE Copper Queen Branch of the Phelps Dodge Corporation has been operating in the Bisbee District since 1880. The policies and methods which have been developed for the purpose of securing harmonious relations between the company and the employes, during the 45 years of continuous operation, came about fundamentally for no sentimental or paternalistic reasons, but because it has always been recognized by the management that the interest, good will, and cooperation of the employes was essential to successful operation and good management.

Operations

The mining and milling operations of the Copper Queen Branch are located in the Bisbee District and consist of the underground mine, which furnishes direct smelting copper and lead ores; the Sacramento Hill steam shovel operations, which furnish concentrating and leaching ores; the concentrating mill and leaching operations, as well as the mechanical shops, power plants, and other service departments.

The reduction works of the company are located at Douglas, Ariz.

Bisbee operations furnish employment to 2,100 employes, and approximately 750 are employed at the reduction works.

Labor Conditions

Bisbee has always been an American camp. Eighty-nine percent of the underground employes of the Copper Queen are American citizens, 5 percent have signified their intentions of becoming citizens and 6 percent are classified as noncitizens; however, many of the noncitizen group are employes having long service with the company.

Sixty percent of the employes are married and have families residing in the district.

Mexicans are employed for unskilled surface labor and constitute 26 percent of the total force.

At the Bisbee operations there are 46 employes who have over 20 years' service with the company, 153 employes having from 15 to 20 years' service, 186 employes having from 10 to 15 years' service, and 185 employes having from 7 to 10 years' service. In all 25.7 percent of the total number of employes, including Mexicans, have over seven years' service with the company and approximately 30 percent of the employes own their own homes in the district.

With the exception of a short time during the war period, there has always been available a sufficient supply of both American and Mexican labor.

The companies of the district have always operated on an open shop basis.

Local Conditions

The permanence of the personnel of the mining companies operating in the District has resulted in the establishment of a community of home owners and the subsequent development of civic pride. Living conditions are of the best, the district is noted for the excellence of its schools and is comparable with eastern cities in regard to conveniences and living conditions.

The Library at Copper Queen

Hours of Labor

The underground mine is operated on a two shift basis, six days a week, the shifts changing every two weeks. Eight hours from collar to collar of the shaft constitute a shift, one-half hour for lunch is allowed on company time.

In all other departments eight hours, exclusive of one-half hour for lunch, constitute a shift.

Wages

It has always been the policy of the company to pay a wage equal to or greater than the wage paid for the same work in other mining districts. At present miners receive $4.95 per shift; muckers, trammers, and carmen, $4.40 per shift; mechanics, $5.50—$5.23 per shift; mechanics' helpers, $4.13; and Mexican labor receives from $2.42 to $3.30 per shift.

In addition to the direct wage, approximately 95 percent of all underground employes, employed on stoping and development work, participate in bonus earnings. All men engaged on development or stoping work are given an opportunity to earn an individual production bonus based on past performance records.

The object of the bonus plan is to equalize opportunity and to give each individual the same chance to earn the same bonus for the same intelligence and effort, regardless of the class of ground or kind of opening which he is driving.

Policies and Methods for Promoting Industrial Cooperation

It has been said that "Harmony or discord between management and employe determines, in no small measure, the success or failure of the enterprise"—most certainly public estimate of the mining industry has been based very largely on the discord between these two factors.

Under any or all systems of industrial ownership, the problem of human relationship and adjustment between managers and employes remains and it remains substantially the same problem. The Copper Queen Branch has made a sincere effort to satisfactorily solve this problem, and the policies and methods which have been developed should be of interest to both employe and employer.

Labor Department

In order to coordinate the various activities pertaining to the relations be-

*Manager, Labor Department.

tween the management and the employes, the Copper Queen Branch established some years ago a labor department and all matters relating to industrial relations are under the general direction of this department.

Working Conditions

The nature of the conditions and environment under which employes do their daily work is a most important factor in securing harmonious relations. As mining is a hazardous occupation, the question of safe working conditions is naturally uppermost in the minds of the management, and it is the policy of this company to make its operations as safe as it is humanly possible to do so. No expense has been spared in order to conduct operations in a safe manner, or in the installation of safety guards and devices.

The underground workings are well ventilated, free from excessive heat and humidity, and are kept in a clean and sanitary condition.

At each operating shaft and at each surface department a modern and sanitary change-room is provided. The change-rooms are steam heated, equipped with shower baths, hot and cold water systems, lockers and equipment for drying damp or wet clothing.

Safety and Accident Prevention Organization

The safety organization is composed of a Phelps Dodge Corporation Safety Committee, of which the general manager of the corporation is chairman. At each branch of the corporation there is organized a general safety committee, of which the branch manager is chairman. This branch committee is composed of superintendents, department heads, and workmen, and is responsible for the successful conduct of the safety work at the branch.

In each operating department there is organized a departmental safety committee, of which the superintendent or department head is chairman. The other members of the committee being chosen equally from the supervisory force and the workmen. The chief duty of each departmental committee is to establish safer and better working conditions for the employes in its own department.

In addition to the committee organization, a trained safety inspector and a first aid and mine rescue instructor is employed. The safety inspector has general supervision of all safety work.

Regular classes are conducted for the purpose of training employes in first aid, helmet and mine rescue work. At present there are 300 employes on the pay roll who have been issued first aid certificates certifying that they are trained in first aid practice, and 60 employes in the underground department who have been issued certificates by the Bureau of Mines as trained helmet and mine rescue men.

That the accident rate can be reduced through proper effort and education and mining operations be made as safe as many other lines of industrial employment is evident from the following statistics:

Comparative Accident Statistics All Departments

Accidents per 1,000 Shifts Worked	1922	1923	1924
	1.16	1.19	1.04

Underground Department

Accidents per 1,000 Shifts Worked			
	1.94	1.65	1.17

The above figures include all accidents which resulted in the loss of time, even a fractional part of a shift. All accidents are reported, no matter how slight the injury might be.

Employment

All applicants seeking employment make application to the employment agent. After a satisfactory personal interview and investigation, they are given a physical examination, and receive general instruction in the rules and regulations of the company.

Training Department

All new employes in the underground department are placed in the training department. This department, in a section of the mine reserved for the purpose, instructs the green or inexperienced worker in the fundamental operation of mining, and at the same time carefully observes each individual employe in order that those not adapted for mining or those, who by their conduct or actions, indicate that they will not be desirable employes, are removed from the pay roll before reaching the regular operating divisions.

Aside from instruction and training in fundamental mining operations, the employes of the training department also receive instruction regarding the safety rules and the more common hazards of mining from the safety inspector as well as an explanation of the policies of the company by the employment agent.

The training department also acts as a reservoir from which employes may be transferred to the regular operating departments as needed, thereby avoiding the necessity of a haphazard selection and placement in times of temporary labor shortages.

Discharge

If, for any reason, a foreman or boss finds an employe unsatisfactory, the employe is returned to the employment agent with a recommendation for discharge or transfer.

After investigation and consideration of the recommendation and reasons given by the foreman, the employment agent may discharge or transfer the employe to another department; thus, the right of a foreman or boss to remove from his department any employe whose services are unsatisfactory is unquestioned, but the foreman cannot dismiss the employe from the service of the company. The employe, at all times, has the privilege of appealing his case to the grievance committee.

A very definite and fair policy concerning matters of employment, transfer, and discharge, together with the right of appeal, has been worked out by the employes' congress. This code of rules insures, in so far as is humanly possible, a square deal to every employe.

Employes Representation Plan

Employes representation is not new at the Copper Queen; since, for many years prior to the inauguration of a formal representation plan, various employes' committees had functioned in a limited way.

The development of employes representation at the Copper Queen, together with an outline of the representation plan, was covered in an article by the writer in The Mining Congress Journal, issue of June, 1923.

The plan has not been changed since its inauguration and the results obtained thus far have been all that were expected. We believe that the employes of this company have grasped the idea that the interests of the employe and his employer are mutual and that neither can succeed unless both succeed, and experience thus far would indicate that when the complete facts in a given case are laid before the representatives of the men, they can be depended upon to reach a logical, just, and sane decision.

We believe that ordinarily too much is expected of employes representation and do not believe that representation alone will absolutely insure against labor trouble, but rather it will tend to minimize labor disputes through the growth of a better understanding, and at least give the company some means of dealing with its employes in the settlement of small questions, which if allowed to remain unsettled invariably grow into larger questions.

Authority is granted the representatives to discuss and legislate on questions relating to working conditions, safety, hours of labor, wages, in fact all matters of mutual interest to the employes and the company.

It was realized that if the power to legislate on certain subjects was denied then the plan would be almost certain of failure. If those matters which are of the greatest importance to employes and to employer, and over which the most

serious controversies result, could not be settled satisfactorily through the means provided under the plan, then obviously the plan would not accomplish the purpose for which it was intended, and from the standpoint of the employes, it would be a plan with form but without substance.

The plan has now been in effect for four years, and the interest of the employe is becoming increasingly more noticeable. At the recent election, held December 28, 1924, for the purpose of electing representatives, 1,332 ballots were cast. Eliminating the Mexican employes, this vote indicates that nearly 95 percent of the men working election day voted.

Method Provided for the Settlement of Grievances

Prior to the adoption of employes representation, the management found that the most difficult problem with which they had to contend was the settlement of minor grievances, and there was no satisfactory method for placing before the employes the facts relating to specific grievances. As a result, the agitator and malcontents had unlimited opportunity to present their own version of these matters and the employes rarely ascertained the real facts in a given case. It was therefore decided to provide for a grievance committee. The powers of this committee are defined as follows:

"Congress shall have the power to appoint a standing committee to consist of three members from the house of representatives and two members from the senate, to be known as a grievance committee. It shall be the duty of this committee to hear grievances of employes and to decide upon settlement of same. Decisions made by this committee shall be submitted in writing to the manager. If he concurs he shall see that the decision is promptly enforced. If he does not concur, he shall promptly call the committee in conference for further consideration of the grievance. If a majority of the committee and manager fail to reach an agreement as to settlement, the grievance shall be submitted to the supreme court for final decision, and if the employe submitting the grievance is not satisfied with the settlement of his grievance he may appeal his case to the supreme court."

After four years of operation under this method of settling grievances, the employes feel that they can appear before the grievance committee and secure a fair hearing. As yet the company has never had a decision rendered against it by the grievance committee or the supreme court which the management did not feel was fair, and based on the facts in the case.

The necessity of providing adequate medical and hospital service is more acute in a mining camp than in the more densely populated industrial centers. Unless employes are able to secure hospital service and the services of competent physicians at a reasonable rate, naturally those employes having families will move elsewhere.

The Copper Queen Branch, at the very beginning of its operations, established a plan whereby its employes are provided with the best of medical and hospital service upon payment of a reasonable rate each month. While operations have expanded and become more diversified and the number of employes increased, the plan of medical and hospital service has never been fundamentally changed.

Under the provisions of the hospital department, single employes pay $1.25 per month, married employes $2 per month. The payment of this fee entitles employes to both medical and surgical care without additional charge. Families of employes paying married employes' rate are entitled to medical treatment, but are required to pay for surgical attention. In such cases a maximum and minimum scale of charges for operations has been worked out. Confinement cases are handled free of charge when the employe has been in the service of the company for a period of three months.

The company has erected a large and complete hospital, and maintains a staff of competent nurses. A dispensary located in the business section of Bisbee was also built and equipped to handle office calls, treat minor injuries, and issue the necessary medicines.

A staff of six physicians, including the chief surgeon, and a pharmacist are employed.

The dues paid by the employes to the medical department have never covered the entire cost of operation.

Employes' Benefit Association

Accidents, occupational diseases, and general sickness are contingencies which every one in industry faces. They are a cause of anxiety and dread to the workmen and a cause of expense and embarrassment to the management unless some provision is made to provide for cases of this nature.

Loss of time or disability incurred through accidents occurring on duty is handled under the provisions of the Arizona State Compensation Act.

To provide for accident and health insurance, not covered by the State Compensation Act, the Employes Benefit Association was established in 1910.

Members of the Benefit Association receive half-wages, not to exceed $75.00 per month, during the period of their disability, when incapacitated by sickness, accident off duty, or an accident on duty in which the loss of time is less than 14 days' duration. In the event of death, due to natural causes or an accident off duty, one year's wages, not to exceed $1,500, is paid to the member's dependents.

The association is maintained by joint contributions from the members and the company as follows:

A. Members contribute 2 percent of their monthly earnings, but not to exceed a maximum earning of $150 per month. This contribution, in the case of a miner, amounts to about $3.00 per month on the present wage scale.

B. The company agrees to contribute $15,000 annually to the association provided 50 percent of the employes, exclusive of Mexicans, are members.

The affairs of the association are administered by a board of trustees, one-half of whom are appointed by the management, and one-half elected by the members of the Association. The details of operation and the payment of claims are handled by a superintendent appointed by the trustees.

That the association is successful and popular with the employes is evident by the fact that during the year 1924, 90.4 percent of the employes, exclusive of Mexicans, were members of the association. The members of the association contributed $60,720 and the company $15,000 and the association completed its fifteenth year of operation with a surplus of $69,728.88.

Since the association was established it has paid $275,859.75 in death benefits, $183,528.99 on accident benefits, and $354,864.06 in sickness benefits, or a total of $814,252.80 in the 15 years of operation.

The following analysis of cases handled during the year will show the frequency and severity of accidents and sickness occurring to members of the Association:

	Number of Claims for Disability	Average Amount per Case	Length Disability No. Days	Number of Cases per 100 Members
Accidents on Duty	367	12.48	5.41	21.4
Accidents off Duty	137	29.80	12.86	8.0
Sickness	541	44.25	19.42	31.6
Total.....	1045	31.10	13.63	61.0

Home Building

Recognition of the importance of housing its employes in a suitable manner, the company has indirectly assisted in aiding employes to secure their own homes.

The Cochise Building and Loan Association furnishes the means by which the workmen of the district may finance the building of a home. In addition to the building and loan association the companies operating in the district founded an organization for the purpose of loan-

ing funds to employes for a period of 100 months to erect homes, the money being paid back at a very low rate of interest.

LIBRARY AND READING ROOMS

A public library is maintained by the company exclusively. Over 9,000 volumes are on file, as well as 24 daily newspapers and 60 current magazines. The library is well patronized and renders an excellent community service.

PENSION PLAN

What to do with the superannuated employe is a question that has to be faced sooner or later by every employing concern.

The presence around the plant of men who are no longer able to do their full share of the work is demoralizing and makes for inefficiency. If a makeshift policy is adopted and the management tries to find light work for the old employe, he creates a job for him of no particular importance or value to the organization, and perhaps as a crowning indignity after years of efficient and faithful service he makes him a watchman. As the size of the concern increases such methods tend to become impossible as remedies for a situation that is constantly growing. Of course, another alternative is to discharge the employe as soon as his powers begin to decline; however, few employers wish to do so unhumane a thing.

The Cooper Queen pension plan was adopted as a solution for this problem. Under the provisions of the pension plan employes may be retired on pension, either on the request of the employe or upon request of the company on the following conditions:

ELIGIBILITY FOR PENSION

A. "After a period of 22 years continous service. (Voluntary retirement.)"

B. "After a period of 15 years service when in the judgment of the pension board and the board of directors of the company an employe is physically or mentally incapacitated for further work or cannot perform, in a satisfactory manner, the duties required in his occupation."

"The term of service shall be reckoned from the date the employe first began work with the Copper Queen Branch and must be continuous subject only to the exceptions made in provisions of the pension plan."

AMOUNT OF PENSIONS

"The amount of each pension shall be determined by the number of years the employe has been in the service, his average annual earnings during the service period, and his age at the time of his retirement, and shall be calculated as follows:

A. "Any employee who has reached the age of 58 years or more at the time of the approval of his application for pension shall receive an annual pension equivalent to 2 percent of his average annual earnings during his service period, multiplied by the number of years of service to his credit."

B. "Any employee who is less than 58 years of age at the time of the approval of his application for pension shall receive an annual pension equivalent to 2 percent of his average annual earnings during his service period, multiplied by the number of years of service to his credit *and reduced according to the expectancy of life at his age as compared with the expectancy of life at the age of 58 years.*"

C. "The amount of the annual pension shall not exceed the sum of $1,500 or be less than $300."

LIMITATION OF LIABILITY

"In order to carry into effect this pension plan, it is the intention of the company to contribute the sum of $150,000 per year for such purpose, but in no event shall the company contribute a greater sum than $150,000 per calendar year for such purpose, and if the amount contributed by the company should prove insufficient to provide for the payment of pensions at the rates hereinafter named, new rates shall be established proportionately reducing all pension payments."

RESULTS

That the pension plan is not only popular with the employes but that it has been helpful to the company in stimulating loyalty, lessening turnover and promoting good will there can be no doubt.

The plan was established in 1913 and revised in 1923. Essential data for the year 1924 was as follows:

No. pensioners January 1, 1924....	102
No. pensions granted during 1924..	12
No. pensioners deceased during 1924	6
No. pensioners January 1, 1925....	108
Total pensions granted to date.....	134
No. pensions terminated to date....	25
Pension payments for year 1924	$69,589.15
Average annual pension.....	$646.53

ZINC RETORT RESIDUES

THE Bureau of Mines has received so many inquiries concerning the possibility of profitably treating retort residues that an investigation of residue utilization was deemed advisable. As a first step a survey was made of the processes already tried and of those now in use. The treatment of broken retorts and condensers was included in the survey as a closely related subject. This survey showed that there was little occasion for further experiments of a general nature, but that the management of each individual zinc-smelting plant must decide for itself, according to local conditions, the feasibility of and the best methods for treating residues profitably. In Technical Paper 341, the author has described a variety of methods for the treatment of zinc retort residues. Most of these methods are or have been in actual use in one or more zinc smelters. Different conditions require different methods; some methods have been successful in certain plants and unsuccessful in others.

It is probable that conditions at some plants prohibit the profitable treatment of retort residues by any method; on the other hand, it is probable that many companies which do not now treat their residues could do so by selecting the proper method and adapting it to their particular conditions.

The treatment of old condensers is simpler than that of retort residues, and it seems that most zinc smelters could with profit build at least a simple jigging plant for their concentration.

Technical Paper 341, "Metallurgy treatment of zinc-retort residues," may be obtained from the Superintendent of Documents, Washington, D. C., at a price of 5 cents.

PUBLIC LANDS

DURING the month of April, 90,000 acres of public land in Colorado and Utah were classified as areas valuable for power-site purposes.

The classification was made by the Geological Survey. The area of outstanding withdrawals of power-site lands was increased about 2,000 acres in California and decreased about 3,000 acres in Colorado and Idaho. In California, Colorado, Utah, and Wyoming, about 1,000 acres of land previously included in public water reserves were restored to entry and made a part of the public domain again.

A little more than 25,000 acres of land in California, Idaho, Kansas, Montana, New Mexico, Oregon, Washington, and Wyoming were included in formal orders designating the land as nonirrigable under the enlarged homestead acts and to that extent subject to entry as homesteads of 320 acres or less. More than 200,000 acres in California, Colorado, Idaho, Montana, Nebraska, New Mexico, Oregon, South Dakota, Washington, and Wyoming were classified under the stock-raising homestead law and designated for entry in tracts of 640 acres or less. Much of the acreage involved in these designations is included in original entries or in applications under the enlarged and stock-raising homestead acts which confer a preference right.

More than 60,000 acres in Nevada were designated under the ground-water reclamation act of October 22, 1919, under which applications for permit to explore for underground water for irrigation purposes may be granted to individuals or associations for areas not exceeding 2,560 acres.

THE INDUSTRIAL SITUATION IN WEST VIRGINIA

West Virginia Has Been Holding The Spot Light In Industrial Affairs And Is At The Present Time Efficiently Working Out Her Problem, But Until The Public Understands Both Sides Of Dispute, Industrial Cooperation Is Difficult Of Attainment

By JOSIAH KEELY*

THERE is little hope of any real industrial cooperation between an employer and his employes until the general public has a reasonable understanding of the facts of the industry. The public is a sort of umpire, and its ruling, whether right or wrong, affects industrial relations. It is unfortunate that so many of the statements issued by those in possession of the facts have been received as publicity stuff and propaganda, as the attitude of the public is vital. In order to demonstrate the psychology of suggestion, I once saw a little boy howling dismally because a sympathetic mother repeated over and over, "Poor little fellow," in various tones of commiseration. There was absolutely nothing wrong, but self-pity was aroused by this artificial stimulant. It would not be so bad if associations of psychologists were just amusing themselves by studying the reactions of their pity for the "poor little miner," but when it comes to some of the best people of the land not only joining the chorus of "poor little miner," but actually believing in it, it is no wonder that the miner is slow to recognize attempts at fairness and the operator takes a "what's-the-use" attitude. Moreover, the operator himself has some cause for self-pity, which, psychologically, does not make for peace either with his men or with other operators. The coal industry is in a bad way.

Only a short time ago the coal men felt that if the government and all the other fixers would just let them alone they might be able to stage a comeback. The railroads especially were pointed out as the real weak spot, and it was felt that if they could be made to function normally, healthy competition would do the rest. This has proved true in so far as coal shortages are concerned, and prices. The public is so well satisfied that it is doubtful whether they can be interested in what has happened to the coal industry, but, as umpire, they must see that neither the operators nor the miners are particularly happy. Wages have been effected, and, where agreements could be made with miners on a lower scale, mines have run, but where the war wage prevails there is much unemployment. There is little disposition among the miners to accuse the operators of wage oppression. Agreements on the 1917 scale have been easily made. The miner has his choice of working on the lower scale, or loafing on the higher, and the mine workers themselves admit that the price of coal does not warrant the high wage. It goes without saying that the question of industrial cooperation does not come up where the mines are idle, and, where they are working under individual contracts between the operator and his own employes, there can be no very fruitful source of misunderstanding. So, in theory, West Virginia presents a picture of everyone at peace, if not satisfied. But this is far from the actual facts.

A rather definite cleavage has arisen between the peaceful camps of idlers and the peaceful camps of workers. It is not in human nature for the camps which have shut down to wait for prices to come up, to view with complacency the feverish activities of their neighbors trying to keep solvent by producing record outputs of cheap coal, thereby not only seeming to live but to make it more and more impossible for the others to ever start up. Then, when the American newspaper reader picks up a paper and reads, "Another Killing in West Virginia," or "Evicted Miners Starving in Tents," he says at once, "Poor little miners, victims of the greed of the coal barons." And it is repeated so often and in such convincing tones that everyone, including the miner, believes it and sobs.

A very definite economic condition has arisen. The railroads which were at one time nearly put out of commission by a hostile public and could not haul the coal have made an almost spectacular recovery. The failure to handle the coal in times past kept the market price up to where everyone could do a partial business and pay the war wage, the public, not very cheerfully, paying the bill. But now that the railroads have been taken care of and the public are paying in freights what they formerly objected to paying for coal, there is no more coal shortage and the markets are glutted. Also, this condition keeps up with only part of the mines running. This being the new economic situation, and the coal men either not having enough solidarity to meet it, or else fearing the Sherman Law, the miners have undertaken to meet it by attempting to shut down all mines operating under anything other than the Jacksonville three-year agreement. The six-hour day had been proposed, but failed partially, or totally, because they expected the operator to stand the difference on day labor. About all the industrial strife in West Virginia today is the outcome of organizations which cannot operate on the high scale seeking to limit output so as to bring back the price of coal. The only way to prevent natural laws from taking their course is some kind of violence, hence the press accounts from West Virginia. The advocate of shop government has the satisfaction of seeing practically every miner agreeing with his own employer but set upon by miners from other camps. To the outsider, it may look like the "poor little miner" was but continuing the age-long fight for wages, but it is really a fight to see if there is any place in America where a miner can work or not as conditions appeal to him, and, while the unrest is generally laid to the miners, it is hardly probable that the operators who have a three-year contract with their men and cannot work on it are entirely disinterested in the outcome of the attempts of their men to shut down their competitors. What, in some cases, may present a semblance of the old-time strike, is often accounted for by men from the hostile camps securing work at the lower wage mines for the express purpose of formenting trouble and shutting them down. It is a unique feature of all the strikes reported that no demands have been presented to any official of the company. The miner is explaining, if he makes any statement at all, that he is helping the operator do what he cannot or will not do for himself. The whole object of the drive is to curtail output by keeping as many miners in tents as possible, or, better yet, in the company houses just as long

Miners' Club House, Empire Coal & Coke Co., Landgraff, W. Va.

*President, Cabin Creek Consolidated Coal Co.

as any device at law will stave off a writ of possession. Tipples have been burned, machinery destroyed, and men killed to keep down production, with little pretense that the operator is in any way responsible for the trouble, or to be blamed for trying to operate. It is probably the frankest campaign ever waged, in so far as the real objects are concerned. In the public addresses it is openly stated that the price of coal will not allow the high wage and that the operators can not combine to raise it. That the cheap coal must be stopped, and, if the operator of cheap coal and his men get in the way, so much the worse for them. In other words, most of the labor troubles in times past have been classed as defensive warfare against the aggressions and abuses of the operators, and have carried with them the malice and hatred of men who believed themselves to be wronged. Today, the trouble in West Virginia may be considered offensive warfare against an economic condition for which the operator is not responsible, only that he is putting out more coal than the country needs. At the present time, no humane treatment, no system of cooperation, no individual contract, and no plan of cooperative mining excuses the sin of producing cheap coal.

This is not an entirely new phase of labor troubles, but it is perhaps the first time the situation has been plain enough to invite the public to analyze it with assurance of its being accepted and easily understood. The public is being asked to pay more for coal in order to keep in existence a top-heavy industry, and this attitude is not confined entirely to the miners, but there seems little doubt that if the coal industry were whittled down to the mines which ought to run in order to produce the coal needed, the miners could get their wage, the operators their profit, and the public its coal at a price not greatly exceeding the low markets of today. However, some of the unskilled miners would have to go elsewhere, many high salaried coal company officials would have to drop out, and there would be much loss of developments and equipment. Also the conservationist would protest at the acreage of coal abandoned and lost forever.

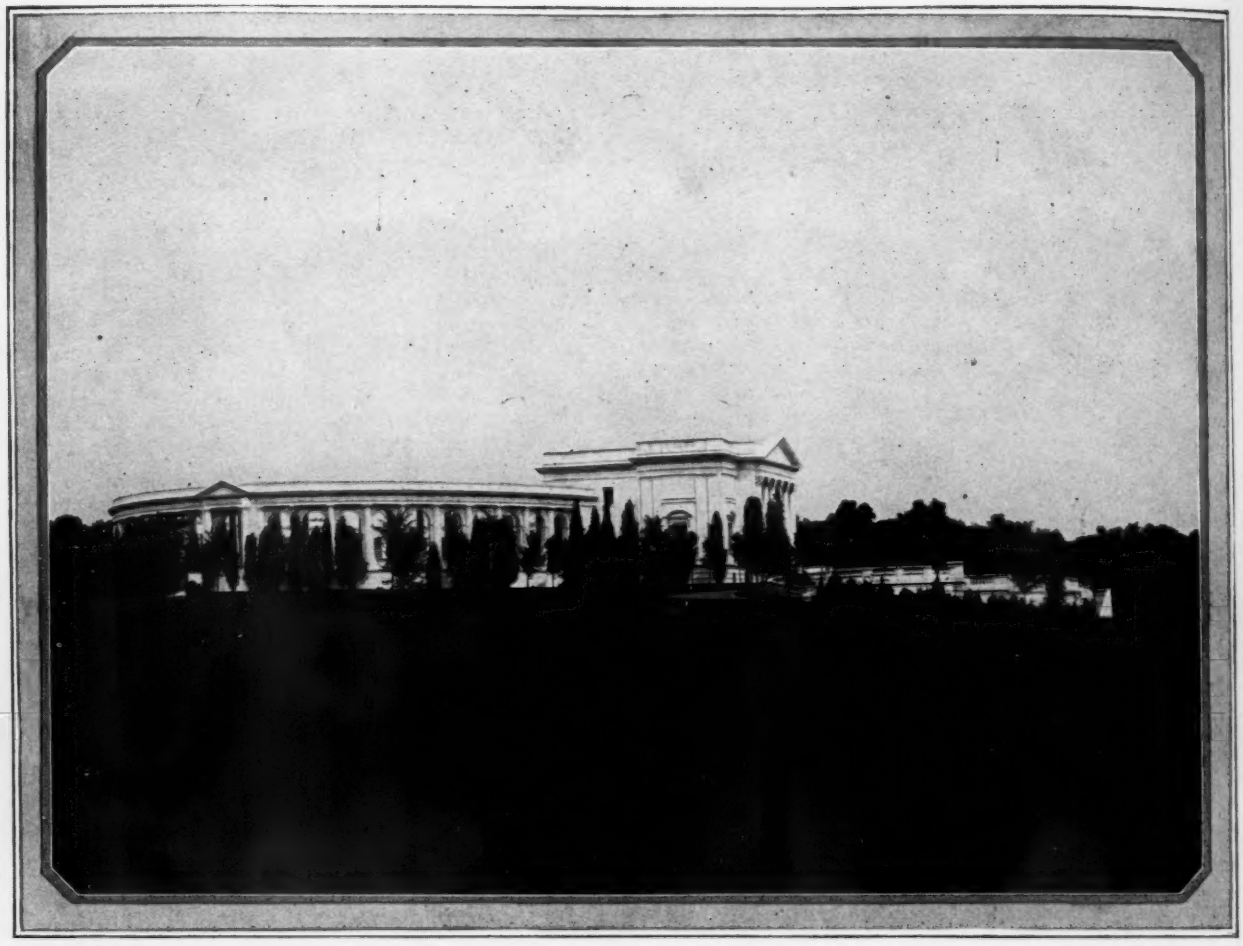
And what has this got to do with Industrial Cooperation? About everything: Industrial peace depends on steady employment, for one thing, and it depends on mines making a profit. It depends on miners staying long enough in one place to know their employers, and their employers to know them. It depends on mine officials having some time to attend to the life of the camp outside of the everlasting grind of holding a job by producing coal cheaper than a sales department can sell it. It depends on there being enough profit in the business for camp improvements and other things that high wages do not supply.

Probably undue prominence has been given in this report to the condition of the industry, but industrial relations is inseparable from the health, or ill health, of the industry. Industrial cooperation has to do with a fair division of the profits, first and always. Conditions of employment and camp rules follow. If there are no profits, then the employe gets his, if there is work, and the company goes without, or, more commonly, seeks to get its share through the stores and through failure to keep the houses in decent shape. If the profits depend on chance orders, and adjoining camps are raided to fill them, there is a scramble for profit instead of that reasonable assurance which ought to go with a great and important industry. A scramble is always fruitful of animosities. Point out any industry, or shop, where a system of cooperation seems to be working, and it will be working smoothly because of the profits. Doubtless there is a reciprocating element, and industrial harmony augments the profits, but the machinery of Industrial Cooperation must be "primed" with some profits to set it going.

At the first reading this report may seem to fail to present anything constructive and to dwell too much on the dark side of the problem. It is not all that could be wished, but we have touched on certain aspects that ought to lend some encouragement to the well wishers of industrial relations. For one thing, the tendency of the individual operators to do business with their men independently is worth something. It shows a disposition to talk the matter over and to understand the needs of each. As stated before, there is more harmony in the units making up the industry than ever before, and the discordant elements, in some cases, are even from without the state. The statement has been made many times and from various sources that there would never be any real harmony in the coal fields until all the mines were either organized under the United Mine Workers of America, or all free from its influence. It looks as if West Virginia might have a chance to prove the open shop plan, as added to the fact that certain sections of the state have always opposed the organization, is the feeling that no mines in West Virginia can work on the wage scale held to so stubbornly by the mine workers. Something may come of the growing recognition that the miners and the operators are, in a sense, fellow sufferers in an economic condition that is just beginning to be understood, but instead of attempting to hold up the public for a temporary price advance, both operators and miners must go along with the natural evolution now in progress. Already most of the large consolidations are working but part of their mines and completely abandoning some. More consolidations are being made in order to do the same thing. Where a mine is unfit to stand the competition, it will either drop out and rust alone or join a consolidation and be cut out by them. In any case, certain mines are doomed. Every mine that drops out helps the railroads increase their haulage records and decreases the cost of haulage so that freight rates can be reduced. Every mine that drops out increases the tonnage at the remaining mines, making the cost of production lower. Every mine that drops out drives out its unskilled miners and puts more miners in the remaining mines to increase their efficiency. As jobs become harder to get, imaginary grievances will be forgotten and industrial cooperation will become more nearly possible. Miners and operators are not such a different class of humanity that they need always be pointed out as festering points in American civilization. There has been a cause for it all, and it is one of the most encouraging signs of America's greatness that it has a way of solving its problems. If West Virginia had nothing else to report except that a representative of the miners had proclaimed publicly that coal was being sold at a loss, it would be a significant report.

Slab Fork Coal Co., Slab Fork, W. Va.

A new freight rate system whereby rates would be adjusted according to the value of the commodity to the public is suggested to the Interstate Commerce Commission by A. W. Stebbings, of Elmira, N. Y. Mr. Stebbings says that the greater the value of the commodity to the community, the lower should be the rate. Essential basic industries would receive encouragement through favorable rates, tending to solidify these industries upon a sound economic basis, which would strengthen other industries.



Memorial Day, 1925—Amphitheater, Arlington National Cemetery, and Grave of the Unknown Soldier

© Harris & Ewing

The world is turned memorial
Crying "Thou shalt not forget."

THE REAL ISSUE IN THE COAL INDUSTRY

Labor, While Contributory, Is Not Real Cause Of Coal's Depression—Operator Who Sells Coal At A Loss Is Courting Bankruptcy—Policy Of Government Toward The Industry Of Great Importance—The Real Issue Set Forth

By J. F. CALLBREATH*

TO select the real issue from among the thousands of important problems with which the business and industrial life of the nation is struggling, can only be accomplished by assuming that all these issues come together at some central point and have relation to and grow out of some central requirement.

The purpose of all business is to earn a profit. The great machine called business is the essential basis of the homes of the country. Very happily man is largely so constituted that, having provided for his own home, he continues knowingly or unknowingly to utilize that same talent in providing homes for others.

The prosperity of the coal business has to do not only with the homes of the operators themselves but to the homes of three-fourths of a million miners engaged in the industry; to the thousands of men engaged in devising and building the machinery and equipment used in coal production; to the thousands of men employed by the railroads in transporting the coal to the consumer; and to the millions of people whose living income is made possible by the cheap power based on cheap coal which has made the United States the leading industrial nation of the world.

The troubles of the coal men are in part shared by many other industries. These troubles begin either with something which he does or fails to do himself, or with something which he is forced to do or is prevented from doing by some other agency, either with himself or with the government, which is the only other agency with power to interfere with his activities.

It would not be natural for one to look to the labor situation as the chief issue of the coal operators, but I am not sure that the coal operator would know how to act if he found himself in position to direct his own business. I am not sure that the adoption of the 1917 wage scale at Jacksonville last year would have made the coal industry happy. The 1917 scale by every rule of fair play and sensible economies should have been adopted. I am not sure that the United Mine Workers are any better pleased with that contract than the operators who have thereby been forced to close their mines.

There was no Jacksonville agreement in 1910 to 1915, but there were lots of troubles in the coal industry. During those years, the average selling price of bituminous coal at the mines was $1.14 1-3 per ton. There were a few coal operators but only a very few who were happy during that period.

The coal man as a result of bitter discipline is used to hardships. He has become reconciled to troubles which no other industry has had to contend with. But there is one trouble that he cannot get used to—he cannot continue to do business at a loss. I am inclined to look beyond the wage question for the real issue in coal.

If a coal man shall continue to sell coal at less than cost, if he persists in selling coal the mining of which costs $3.00 per ton, for $2.50, no power on earth can keep his business from bankruptcy.

If he persists in mining coal for which there is no apparent market and shipping it to a supposed market, there to await a purchaser, while the demurrage charges on the cars which carry it slowly absorb its value, no power can keep that foolish man from bankruptcy.

And when he is bankrupt his power is destroyed either to protect and support his own home or to provide the employment necessary to the support of other homes.

The coal industry is cursed with capacity for overproduction—according to a very careful analysis made just before the war the then coal mines of the country operating 325 days could produce 780,000,000 tons of bituminous coal annually.

It is safe to say that year in and year out requirements of the country average above 450,000,000 tons. The production of from 400,000,000 to 500,000,000 tons of bituminous coal annually is a very considerable business. In round numbers, it pays $750,000,000 in wages and a billion dollars for transportation. Handling as it does a paramount necessity, carrying as it does the hazards of accident, representing as it does an enormous investment, requiring as it does superior refinements of directive capacity, it should by every rule pay handsome profits. The consumers of bituminous coal in the United States can well afford to pay an amount for its bituminous coal requirements which would leave a net profit to the coal operators of 25 cents per ton or a yearly average profit to the industry of more than $100,000,000.

As a matter of fact at this time the bituminous operators as a whole are losing money. Out of the coal companies reporting to the income tax department of the Federal Treasury from 1922 to 1924, only a few companies reported a profit and the losses shown by the remaining companies counterbalanced the profits of the profit-showing companies and left a substantial loss to the industry as a whole.

Which are the companies that made a profit?

Mostly those who sold their coal before they mined it—or which mined no coal which they could not either sell at a profit or hold without too much expense until it could be sold at a profit. I am convinced that the selling problem contains the real issue of the bituminous coal industry.

The individual operator who sells coal at a loss is not only courting bankruptcy for himself, but he is endangering his fellow-operators and the whole structure of national prosperity.

The world war resulted in the development of production capacities, in every line, to meet the unusual demands created by the waste of war. The shoe industry, for example, can produce largely in excess of possible uses. The shoe industry is so handling the public as to create an increasing demand for its product. Dame Fashion's aid is utilized so that milady must have shoes colored to match her gowns, for which she must pay a price approximating the war peak price levels. The shoe manufacturers run about four days per week, enough to meet the requirements of orders for delivery next fall or perhaps the following spring.

The wise men in the coal industry sell their coal first and then mine it.

The consumer of coal knows his future requirements more accurately than does the dealer in shoes. Why does the one sell first and then manufacture while the other manufactures first what he knows will be an oversupply and ship it to an overstocked market to certain sacrifice?

The best interests of the country will be served by the continuous operation of the low cost mines. The best interest of the high cost mines, which would be forced out of business by the continuous operation of the low cost mines, will be served by being forced out of a losing business until the time comes when the

*Secretary The American Mining Congress. Address before Cincinnati meeting Practical Operating Officials.

country needs and can pay cost and a profit for the production of the higher cost coal.

It would be a public calamity if government shall be permitted, either by consent or by usurpation, to control the individual, and require him to follow the only course by which his business can be made profitable. It would be an equal public calamity for any government to have power to prevent him from making his business profitable.

For a considerable number of years the trend of public thought was strongly toward governmental regulation and interference. The movement toward socialism in government staged its great initial effort under the guise of conservation. We were told that the natural resources of the nation belonged to all the people and that it was the duty of the government to continue this ownership in order to prevent monopolistic control. With the power resources of the west under control of the federal government it became necessary either that the government should go into business or that the west should stagnate.

This iniquitous policy naturally led to governmental interferences in other lines of business. As citizens we have a broad relation to other citizens and business men and we have a broad relation to our government. Our relation to each other is best served by the success, along legitimate lines, of each individual enterprise. Only through business success can we meet our highest duties as citizens to each other and to the state.

The policy of the government toward business as a whole is of paramount importance to us, not only as citizens, but as business men and as coal operators and we can be thankful that today we have a governmental policy which has declared that there is no real controversy between business and government; which has declared for the utmost progress of legitimate business without governmental interference.

We are gratified, highly gratified, by the new policy of the Federal Trade Commission, the majority of which has recently declared that so long as they remain a majority the commission will act upon the theory that "business success is not a crime; that business failure is not a virtue; that wealth is not presumptively wrong; that poverty is not presumptively right; that industry, economy, honesty and brains should not be penalized; that incompetence, extravagance, idleness and inefficiency should not be glorified." And immediately from the ranks of those who believe in government by inquisition and who have heretofore lauded the commission, comes a demand for its abolition.

We have an executive governmental policy which has directed itself toward the cutting down of expenditures, toward the weeding out of useless governmental functions, which has, in short, declared itself for a lean government. This comes at a most opportune time. It comes at a time when we have among us demagogues who would govern us by intimidation, by scandal and by blackmail; when we have public busybodies on the public payroll who would govern us by a series of fact-finding and fault-finding committees and commissions overlapping each other like the scales on a fish.

This policy of the administration and executive branches of the government toward greater economy, toward less expenditures, toward less meddling and intrusion into the private affairs of citizens has not yet percolated down through the legislative functions of the national government, and it has especially not penetrated the state governments. For them has come down all of those meddlesome, interfering, commission-mad forms of policy which we adopted in such profusion during the war-time hysteria. As a result, there is dripping out of all the legislative branches of the government, both national and state, wild proposals for the regulation of affairs which are foreign to the proper business of government.

The proper function of a government is to provide justice and protection to its citizens and, when it goes beyond that, it is drifting away from free government.

The type of legislation which would regulate the price of wheat, or cotton, or corn, or coal, or any basic commodity is as futile as to pass laws regulating the temperature. There was recently introduced in the legislature of the state of Nebraska a bill which provided for the automatic dissolution of a marriage between a man and a woman if there were no children born to them after a period of three years. In a neighboring state a bill was introduced to limit the size of families in proportion to income. Such legislation would, at least, stimulate travel. Bills have been introduced in various southern states levying extra per capita taxes on people who are not supporting the matrimonial yoke after they reach years of discretion, and the focus of interest today in the grand old state of Tennessee is the trial of a professor of science for the heinous offense of teaching the almost universally accepted scientific theory of the universe. Our lawmaking bodies are legislating on moral questions, on economic questions, on scientific questions, when the only questions which are the proper subject of legislation are man's relation to man and man's relation to society. A recent congressional act provides that in passing upon freight rates consideration shall be given to the needs of business as well as to the cost of service.

The application of such a theory might be absolutely destructive to business enterprises, and even to real estate values, tearing down those towns in which business has become prosperous with a view to building up the towns in which business has not been prosperous, which process would need be reversed as soon as its full effect has been accomplished.

Florida, the state whose wise constitutional amendment prohibiting state taxation of incomes for a period of 50 years, started the flow of millions into investments within her borders—wise Florida—almost reversed herself by a proposal of tax of 2½ percent on the gross value output of all natural resources, thus offering a premium to the idle rich and proposing a penalty on industry. This eruption of comic-opera legislation led the state legislature of Florida to the consideration of a bill requiring that any check or draft on any bank issued by a married man must be signed jointly with or endorsed by his wife.

The bill provides that in an instance where a bank cashed the check of a married man that did not have the signature of his wife attached, the bank would be required to refund to the wife the full amount of the check or draft, together with all expenses incurred by the wife for its collection.

The penalty for failure to comply with the provisions of the act would be a fine of $100 and a jail sentence not exceeding six months.

What is the answer to all of this potpourri of mad legislation, this belief that the American people may by legislative enactment lift themselves by their economic bootstraps.

It is simply this—that as to government there is a very real issue before us which calls for a stern rebuke to that type of legislative mind which would force such conditions upon us, as this mass of legislation is bringing—that we as citizens should see to it that legislatures adhere to those simple fundamental principles of government which guided our republic for 150 years.

These are important issues, but the great issue of the coal industry, may I repeat, is the problem of selling its product at a profit.

The central thought in this great gathering at Music Hall has looked toward greater efficiency in coal production, but will the operators who need it most reap the advantage, or will it go to the consumer? I admire altruistic efforts, but altruism must be practical to be of service.

Intelligent selfishness is the basis of all real progress. I believe the time has come when the coal operator should apply that rule. (*Continued on page* 318)

NO SIMPLE SOLUTION OF COAL'S PROBLEM

A Complex Difficulty Involves A Complicated Remedy—The Search For A Single Contrivance Is A Waste Of Time, But This Does Not Mean That There Is No Simplification Of Coal's Problem

By George H. Cushing

ANYONE even reasonably versed in mathematics knows that it is a simple problem to add one-third, three-fifths, five-sevenths, and seven-ninths. That is a mere matter of finding a common denominator and of translating all fractions into it. But, it is a far more tedious and difficult calculation to find how far a drunken man walks when he is traversing even a single city block; each step is liable to be in a different direction and of a different length. The difference between the two calculations is that there is order in one and disorder in the other. One has a common denominator; the other has not. Unless there is a common denominator, it is out of question to find a simple device by which the problem can be solved.

These days, the known and amazing fact is that the bituminous industry has fallen into a complicated disorder which defies comparison with any situation in economic history. Men of the broadest experience have never seen anything like it in their life-time. Men of broad information have read of nothing like it. That being true, it is quite natural that the coal people should be discussing little else, and that this discussion should take the form of an inquiry. "What is the way out? What can be done that will solve the coal question?" In such discussions, the quest is always for a single simple device which, by being created and put in operation, will, ultimately, solve all the difficulties of the coal industry. Those who talk about such things believe it is entirely possible to find a common denominator for all complex difficulties of the coal business. Indeed, it has been the very search for this one device, or one method of procedure which has confused the industry and delayed, for years, the measure of relief which is possible but which falls far short of a panacea. The assertion is here ventured, that the coal industry will pass from bad to worse and from worse to practically hopelessness unless the quest of that one device is abandoned and unless it is recognized that a complex situation demands a complicated answer.

To illustrate the apparent accuracy of this self-evident statement, the very nature of the coal business will have to be taken into account as a premises. Coal, in its life-time occupies three positions. That is, undisturbed in the ground, it is real estate; broken down from the vein it is personal property — real estate translated into personal property; while still personal property, but in the possession of the carrier, it is impressed with a commerce interest — personal property become interstate commerce. In each of its three positions, it is governed by a distinct body of laws and subject to different degrees of interference on the part of the regulatory forces of the nation. Thus, even in the very nature of coal, there are three situations for which, in law, no common denominator can be found. Any conscientious court would refuse to adjudicate all three questions as a part of any one of them. That being true, no one device can be construed which will handle coal in those three positions.

Considered in another way, the coal mining industry is probably the second largest employer of labor in the entire country. It has the largest single union. Its employes represent the largest political force, therefore—considered merely on the number of noses involved. On the other hand, coal goes into and touches more intimately than anything, except farm products, the life of every individual in the nation. On that second account, coal is decidedly the largest political factor with which we have to deal. But, the labor wants one thing and the consumer wants another. Thus, the biggest organized group of voters stands opposed to the biggest unorganized body of voters. Politically, there is no common denominator for that situation, either. It is out of the question for any political group ever to satisfy both sides of that equation. To attempt to do so would put it in the power of somebody, somewhere, to make one group the master of the other group, which is a political monstrosity that is unthinkable in a state that prates of its democracy.

Seen in still another light, America is, primarily and essentially, an industrial power—the greatest in known history. As an industrial force, this nation lives on power. Other things may serve, temporarily, as a source of that power. Other things may, eventually, be developed to supply the power. But, temporarily, coal is the sole dependence of the entire nation. On the one side, is a small group interested in coal production. On the other side, is the whole nation interested in coal use. That presents a complex situation for which there is no common denominator. The interests of the producers are centered in a combination, perhaps, which will assure the profitableness of a coal mining venture. The interests of the consumer are centered in breaking up such combinations. Thus, when one force is driving toward consolidations, or combinations, the whole political structure of the nation, foundationed upon the common law, as well as upon our statutes, is devoted to a destruction of such combinations. That makes a common denominator, for that situation hopelessly out of question.

It is not necessary to pursue this subject through all of its ramifications in order to illustrate a simple idea. We have already several subdivisions of the subject which cannot even be composed within themselves. But if we unite in one problem, just the few things that we have outlined, it becomes perfectly apparent that if we cannot find a common denominator for each section of the problem, we cannot find a common denominator for the whole. Stated in simple terms, if we cannot find a simple answer for the labor question, or a simple answer for the price question, or a simple answer for the question of combinations, we cannot find one simple answer for the labor problem, the price problem, and the combination problem all thrown into one problem. It then becomes obvious that what was said at the beginning is especially true, that any progress in the industry has been delayed by the futile search for one device which, even a moment's thought, demonstrates cannot be found at all.

The more we understand how complicated the coal problem has become, the more it will be recognized that the search for one device is clearly out of question. For instance, when the nation was young and when we led the simple life, we had a simple demand for fuel—primarily to heat our places of residence. In those days, wood was burned primarily and coal came into use only as wood became unavailable. The next step was where the demand for coal was supplemented by the use of engines for transportation purposes. Then, we had two uses for coal. But, as transportation broadened and we came to have manufacturing, we had a third use. But, today, that list has continued to grow until coal for heating purposes has sunk into insignificance when compared with the demand for coal in a hundred other directions.

The price question has become just

as complex as has the subdivision of the business. At first, there was a simple problem of a fair price for the coal used for heating. But, as the uses for coal grew, all sorts of specialty coals—highly specialized, both as to quality, adaptability, and size—came into being. Then, the price problem became complex as each size or grade had to contribute its share of the cost of the whole. When one size became too expensive—particularly true in the case of house-heating—the people sought substitutes. And, as they found a substitute, the coal people, wanting to retain their business, produced from coal a coal product which was a substitute for the coal itself. Or, if another size of coal became too expensive for a manufacturer to use, and if he sought a substitute, the coal people, for the same reason, sought another by-product of coal which would, itself, be substituted for the coal itself. The net result of all this complication has been that, ultimately, coal appears in hundreds of forms, and thus coal's children and grandchildren are competing with the coal itself in a common market. A simple illustration will serve also to make that point clear. The ideal coal for house-heating used to be the lump coal. To an extent, that is still true. But, that lump coal must, today, stand the competition of all the sizes smaller than lump, even down to the powdered coal which is the smallest size crushed down to a dust. Even though this itself presents a sufficiently complex situation, all of these sizes have to meet, in addition, the competition of coal translated into coke, into gas, or into electricity.

It is not necessary to pursue that phase of the subject into elaborate examples in order to prove the complexity which surrounds the whole question. But it becomes obvious at once that when this one seperate section is attached to the other questions that have been raised, no possible simple device can be found which will remove all of the complications.

If anything further is needed to show the difficulties in the way, it might be added that it is perfectly possible to gather the figures which represent the production of coal by years, or even by months, or weeks, for a long period of time. It is perfectly possible thereby to show that the production is large today and small tomorrow, and that the record fluctuates over amazing ranges, even as between immediately adjoining periods of time. If one were a mere statistician, and never looked beyond the table of figures immediately under his nose, one might say with utter nonchalance that "there ought to be a way" to level off the peaks and fill up the valleys. On a simple question of mathematics, it is possible to transfer a few million tons of coal from the column which represents October and November to the column which represents April or May. From a statistician's standpoint, there is no difficulty in that undertaking because it merely means moving the fingers a few inches from right to left or from left to right when about to set down the figures. Therefore, what the mathematician does himself so easily he is led to believe that the nation can do just as easily. But, between the transfer of the figures and the actual transfer of the tonnage, in point of time, there is a human revolution which means nothing more than a reformation of the practices of the people making up a great nation.

That is to say, the larger demand for coal in October and November may, conceivably, be due to the fact that a factory uses coal in October and November to make something which it is going to sell at that time. To transfer that coal tonnage, therefore, over into the month of April or May, it may be necessary to persuade that manufacturer to change his production schedule. It may be necessary to have him manufacture in April and May, things which he is not going to sell until after November. Such a violent reformation involves changing the whole business structure and practice of a great nation. This is something that might not be consented to for the mere purpose of relieving the business difficulties of the coal operator.

But, if we take the most obvious, although inaccurate assumption, and if, therefore, we say that the business is heavier in October and November because the people want house-coal at that period, we are confronted by even a larger difficulty. If we want to transfer household buying from October and November back to April and May, we may have to change the buying habits of a substantial percentage of the population of the country. We may have to ask people to buy their house-coal six months before they intend to use it and, maybe, six months before they have the money to pay for it.

If we add this complexity to the problem already grown wholly beyond control, it makes more difficult and more improbable the discovery of any simple device which will solve all of these questions.

Typical School in the Pocahontas Field

It is not here contended, nor will it be contended, that there is no simplification of coal's difficulties. To assume such a posture would be to declare, in the first place, that coal has become bankrupt and must remain bankrupt, because there is no one simple way out of the difficulty. There is no intention to take such a pessimistic view of the situation because that view is not justified. On the contrary, the fact is as stated, that this is an industrial nation and must have coal. Therefore, there must be a coal industry. Those who conduct the industry must, if they are to remain in it, be able at least to remain solvent. Therefore, if the nation is to go on, the coal industry must go on, and if the coal industry must go on, there must be a profitable enterprise in mining coal. That prescription is as irresistible as any other syllogism. But while it is admitted that there is and must be a way to make coal profitable, it does not follow that one simple device is, or can be, found which will dissolve all the difficulties. On the contrary, the business is complex and the solution must, of necessity, be complex.

To illustrate that phase of the question, we will reverse the order in which matters have been discussed and be satisfied with this one simple illustration. The consumers of coal have a fixed habit of buying. That habit, by study, can be discovered. When the buying practices of the American people are thus known and recognized, it is possible for a well-organized coal industry to match its production program with the then known needs and habits of the market. That is, instead of fixing, in coal, a production schedule and asking the people to reform themselves to accord with it, the method of procedure must be to find what the market wants and habitually takes, and then adjust the production program to it. That method of procedure illustrates the required method of thinking about coal which must be followed from now on if the machinery of the coal industry is to be designed to serve the needs of that industry. It is not necessary to pursue that thought any further because the intention, here, is not to design an organization for coal, but rather to indicate its essential character. If the thing were to be summed up in a very few words, it would come to this: Instead of organizing coal and then reforming society to conform thereto, it will be necessary to recognize the complex demands of the country upon the coal industry and re-shape coal's organized machinery to satisfy that demand. That calls, essentially, for a business organization to do a business thing, and not a political organization to try to serve an economic purpose.

THE CINCINNATI MEETING OF OPERATING OFFICIALS

Meeting Largest Yet Held—2,000 Operators In Attendance—Mechanicalization Of Mines Urged As Only Remedy To Reduce Costs In Producing Coal—Exposition Largest And Most Representative Ever Staged—Both Convention And Exposition Unqualified Success

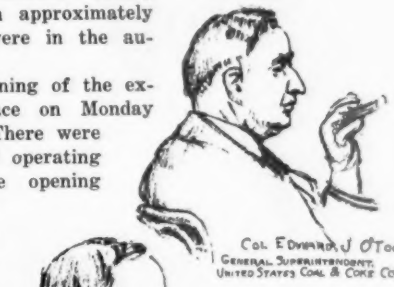
CINCINNATI was again host to the largest group of practical operating coal officials ever brought together in this country, at the annual meeting of Practical Coal Operating Officials and the National Exposition of Coal Mining Equipment, just closed. There were perhaps 2,500 coal operators present, not all at one time, but during the four days of the convention. The largest attendance was on Wednesday, when the discussions centered about mechanical loading possibilities; when approximately 1,500 operators were in the audience.

The formal opening of the exposition took place on Monday night, May 25. There were no discussions of operating problems on the opening day, but two of the Committees of the Standardization Division, The American Mining Congress, met to place before the Mining Correlating Committee their recommendations, to be considered as national standards in the matters of Mine Drainage, and Outside Coal Handling Equipment.

The formal discussions opened on Tuesday morning, May 26, for the discussion of "Mechanical and Electrical Equipment Problems," with **R. L. Kingsland**, Superintendent Power and Mechanical Department, Consolidation Coal Company, Fairmont, W. Va., in the chair.

J. A. Malady, Electrical Engineer, Hillman Coal & Coke Company, Pittsburgh, Pa., opened the discussion with a short paper upon "The Use of Acid Resisting Metals for Mine Drainage Equipment." Mr. Malady said that the cause of corrosion at their properties is due principally to the sulphuric acid found in the water. They have been experimenting with chrome iron alloy, and his paper deals with the results they have obtained. Mr. Malady's article and the full discussion of this important subject will be found in full in the next issue of THE MINING CONGRESS JOURNAL.

Humphrey D. Smith, General Superintendent, American Coal Company, McComas, W. Va., discussed the subject of "Speed Reducers," and gave at length the experiments of his company, and the advantage and disadvantage of this type of equipment. This company now have 17 speed reducers in operation or in the course of erection. These have been in operation some 18 months, and Mr. Smith makes the assertion that in that length of time they have never had to open the gear boxes. Mr. Smith's paper, and the full discussion of this subject, will appear in the July issue of THE MINING CONGRESS JOURNAL.



A few of those who took an active part in the discussions

William Lamont, General Superintendent, Sterling Coal Company, Bakerton, Pa., opened the discussion upon the important problem of "Economies Which Can Be Effected by the Proper Use of Watthour Meters." Mr. Lamont opened his remarks with the statement that "the cost of your power can be checked and distributed only by the use of watthour meters." He stated that the four principal phases of power consumption—transportation, ventilation, cutting and pumping—consumed 100 percent, transportation requiring 43 percent, ventilation 27 percent, cutting 19 percent, pumping 11 percent. This interesting paper and the discussion following its presentation will appear in full in the July issue of THE MINING CONGRESS JOURNAL.

J. B. Hicks, Electrical Engineer, Consolidation Coal Company, Fairmont, W. Va., spoke upon the subject of "General Use of Storage Batteries in Mines," and stated that his company has made six applications of the storage battery in mines, with two others pending further development of suitable motors. His paper goes fully into the experiments and actual conditions encountered in the operation of these batteries at the Consolidation Coal Company, and will be printed in full, together with the discussion, in the July issue, THE MINING CONGRESS JOURNAL.

Control of Mining Equipment was the main subject for discussion at the Tuesday afternoon session. **Charles M. Means**, Consulting Engineer, Pittsburgh, Pa., who was to have presided at this session was unable to be present, and **A. B. Kiser**, Superintendent of Electrical Equipment, Pittsburgh Coal Company, Pittsburgh, Pa., acted as Chairman.

W. H. Lesser, Electrical Engineer, Colonial Colliery Company, Frackville, Pa., opened the discussion, with comments upon "Mine Pumps." Mr. Lesser, operating in the anthracite field, said that during the past fifteen years the companies in their district had changed from the use of their own steam to the use of purchased electricity. Instead of using the old economical steam conformers, they have put in centrifugal pumps. The problems they have met and how they have met them, were outlined by Mr. Lesser, and his paper together with the full discussion will appear in the July issue.

L. W. Householder, Chief Engineer Rochester & Pittsburgh Coal Company, Indiana, Pa., opened the discussion concerning "Mine Fans." Mr. Householder's paper covers this subject fully. He feels that the operator should not condemn his fan for not delivering its specified volume until an investigation is made. Many fans are pronounced to be wrong simply because the air ways have become too small through falls or extensions. He also believes that the

prevailing opinion that "a watchful eye should be kept on the water gauge to detect falls, short circuits," is erroneous. The paper, together with the discussion in full will appear in the July number.

"Tipple Machinery" was presented by **W. C. Adams**, Consulting Engineer, Allen & Garcia Company, Chicago, Ill. Mr. Adams declared for a "simple and effective" system of control of tipple equipment. He asserted that hand operated controls scattered throughout the tipple is no longer practical, and a central control station, where equipment can be started, stopped and regulated as to speed, by one attendant, is essential for the satisfactory operation of a modern tipple and preparation plant. Mr. Adams' article and the full discussion will appear in July issue.

Graham Bright, Consulting Engineer, Pittsburgh, Pa., spoke on "Mine Haulage." Mr. Bright contrasted the drum type of controller, used in the past with a modern rotary set. This paper, together with the discussion, will appear in the July issue.

Automatic Sub-Stations, was the next subject for consideration, and this was opened by **T. F. McCarthy**, Electrical Engineer, Clearfield Bituminous Coal Co., Indiana, Pa. Mr. McCarthy brought out the fact that automatic control of stations cuts down on the number of attendants and benefits and expedites coal haulage.

The entire day, Wednesday, May 27, was given over to a discussion of **Practical Experiences in the Use of Mechanical Loaders.** The papers presented at these sessions, together with the full discussion are found in this issue.

Mutual Adaptation of Mining Methods and Loading Machines, was the main subject for discussion on Thursday. **T. E. Jenkins**, General Manager, West Jellico Coal Company, Sturgis, Ky., was the first speaker, while **Abner Lunsford**, General Manager Fordson Coal Company, Stone, Ky., acted as Chairman. Mr. Jenkins spoke on "With Thick Coal and Thin Coal Under Varying Roof Conditions"; **Edward Graff**, General Superintendent, New River Coal Company, MacDonald, W. Va., led the discussion, telling of the actual experiences with loaders at their properties.

"Some Successful Adaptations" was discussed by **H. S. Gay**, General Manager, Gay Coal & Coke Company, Mt. Gay, W. Va.; **F. E. Dunlap**, General Manager, Helena-Straven Coal Company, Straven, Ala.; **W. G. Duncan, Jr.**, General Superintendent, Duncan Coal Co., Greenville, Ky., and **Heber Denman**, President, Paris Purity Coal Company, Clarksville, Ark.

These papers, together with the discussion will appear in the July issue.

"Utilization of Face and Other Portable Conveyors" was the subject discussed on Thursday afternoon, with **T. W. Dawson**, Consulting Engineer, H. C. Frick Coal Company, Scottdale, Pa., chairman. The discussion was led by **A. M. Ogle**, Pres., Vandalia Coal Co., Indianapolis, Ind.; **F. G. Wilcox**, President, West End Coal Co., Scranton, Pa., **G. B. Southward**, Electrical Engineer,

Three of the Speakers at the "Get Together" Banquet

West Virginia Coal & Coke Co., Elkins, W. Va., and **E. B. Raiguel**, Chief Engineer, Coal Service Corporation, Huntington, W. Va. These papers will appear in full, together with the discussion, in the July issue THE MINING CONGRESS JOURNAL.

The last two sessions of the convention were devoted to **"Effective Practice and Actual Cost of Rock Dusting"** and **"Effective Cutting and Shooting Methods to Secure Greater Realization."**

A. C. Callen, University of Illinois, Urbana, Ill., was chairman of the Rock Dusting session, and **Arthur Neale**, General Manager Pittsburgh Coal Company, **Dan Harrington**, Consulting Engineer, and **W. C. Holman**, Chief Engineer, Phelps-Dodge Corporation, and **James W. Needham**, St. Paul Coal Company, led the discussion. Papers and discussion appearing in full in the August number of the MINING CONGRESS JOURNAL.

George F. Osler, Vice-President and General Manager, Pittsburgh Terminal Coal Co., Pittsburgh, Pa., was chairman of the session devoted to **Cuting and Shooting Methods**, and **C. E. Reynolds**, Mine Superintendent, Allegheny-Pittsburgh Coal Company, Parnassus, Pa., **L. E. Young**, General Manager, Union Colliery Co., St. Louis, Mo., **Charles Wagner**, Glen Alden Coal Co., Scranton, Pa., **T. G. Frear**, General Superintendent, Inland Collieries Co., Indianola, Pa., **T. J. Dawson**, General Superintendent, Yukon Pocahontas Coal Co.; **W. L. McCoy**, Bertha Consumers Co., **C. P. Anderson**, New River Coal Company and **C. W. Smith**, Chief Engineer, Illinois Coal Company, led the discussion. These papers, with the full discussion, will appear in the August number of THE MINING CONGRESS JOURNAL.

An informal dinner and conference were held Thursday evening, in the ballroom at the Hotel Gibson, which was attended by a large number of the delegates. Addresses were made by **E. W. Parker**, Director, Anthracite Bureau of Information; **H. L. Gandy**, Secretary, The National Coal Association; **J. F. Callbreath**, Secretary, The American Mining Congress, and **J. Ernest Allen**, Hayden Stone & Company. These addresses are found in full in this issue.

W. L. Affelder, Assistant to the President, Hillman Coal & Coke Company, gave an interesting address, on "The Advantages of Graphic Charts in the Interpretation of Coal Mine Costs," which were illustrated by lantern slides.

NATIONAL EXPOSITION OF MINING EQUIPMENT

ON May 29 was brought to a close what proved to be perhaps the most successful of the National Expositions of Mining Equipment yet to be staged under the auspices of the Manufacturers Division of The American Mining Congress. This convention and exposition was the fifth of its kind to be held, and each has seen a growth of interest both on the part of the operator and the manufacturer. The first three expositions were held in conjunction with the annual conventions of the American Mining Congress. The fourth convention was the breaking of this policy, and the formation of a convention of practical operating officials, gathered to discuss practical operating problems only. The success of that idea

at Cincinnati in 1924 was so encouraging that it was determined to stage this year's meeting at the same place.

The success of the meeting just closed cannot be measured in cold type. Its discussions will have a far reaching effect upon the industry as a whole, and will be the basis for many changes in operating conditions. The coal mining industry intent upon reducing its operating costs, turned out in large numbers, and was not disappointed in the character of the convention and the problems discussed, or the exhibits.

Mechanical loading in all of its phases was one of the important subjects to be discussed. Operators who have been experimenting with leaders for the past few years were present and gave most interesting papers concerning their actual experiences in the performance of the various machines on the market. Six manufacturers of this special equipment were represented upon the floor of the exposition, two of which—the Simplex loader and the Myers-Whaley Company—had machines in actual operation. The McKinlay loader was shown in a working model.

In order that there may be a clearer conception of the character of equipment shown at the exhibit, which actually comprised equipment covering practically every phase of the mechanical operation of a mine, the exhibitors and their products are listed according to the main feature shown at Cincinnati:

Locomotives

General Electric Company, Goodman Manufacturing Company, Heisler Locomotive Works, Mancha Electric Storage Battery Company.

Frogs, Switches and Mine Ties

Bethlehem Steel Company, Central Frog and Switch Company, Weir Frog Company, West Virginia Rail Company.

Storage Batteries

Edison Storage Battery Company, Electric Storage Battery Company, Philadelphia Storage Battery Company.

Lubrication

Hurlburt Oil and Grease Company, Keystone Lubricating Company, Waverly Oil Works, Bassick Manufacturing Company.

Welding and Bonding

Rail Welding and Bonding Company (Una bonds and welding equipment), Electric Railway Improvement Company (Arc Weld Rail Bonds.)

Ball and Roller Bearings

S K F Industries, Inc., Strom Ball Bearing Mfg. Company, Hyatt Roller Bearing Company, Timken Roller Bearing Company.

Circuit Breaker

Automatic Reclosing Circuit Breaker Company.

Explosives

Atlas Powder Company, E. I. du Pont de Nemours & Co., Inc., King Powder Company, Hercules Powder Company.

Mine Cars

American Car and Foundry Company, Enterprise Wheel and Car Corporation, Hockensmith Wheel and Mine Car Company, Koppel Industrial Car and Equipment Company, Lorain Steel Company, Pressed Steel Car Company, Watt Mining Car Wheel Company, Sanford-Day Iron Works.

J.G. BRADLEY
PRES., ELKHORN COAL & LUMBER CO.
DUNDON, W.VA.

HUGH SHIRKIE
PRES., SHIRKIE COAL CO., TERRE HAUTE, IND.

Interested Visitors at Cincinnati

Automatic Pressure Greasing Machine and Journal Box Trucks

Lincoln Steel and Forge Company.

Cut Bit Sharpener

Sullivan Machinery Company.

Wire Rope and Cables

Broderick and Bascom Rope Company, John A. Roebling's Sons Company, Rome Wire Company, Simplex Wire and Cable Company.

Rock Dusting Machines

Diamond Machine Company.

Gears

R. D. Nuttall Company, Tool Steel Gear and Pinion Company.

Screens

Hendrick Manufacturing Company, W. S. Tyler Company.

Coal Separators

Frederick Iron and Steel Company.

Automatic Feeder

Mining Safety Device Company (Nolan Feeder.)

Chain and Chain Drives

Morse Chain Company.

Automatic Weighing and Recording Machines

Streeter-Amet Weighing and Recording Company.

Lamps

Concordia Electric Company.

Mining Machine Parts and Mine Supplies

Bertrand P. Tracy Company.

Electrical Equipment

Post-Glover Electric Company, Westinghouse Elec. and Mfg. Company.

Cement-Gun Machine

Cement-Gun Company.

Induction Motor

Koehler Manufacturing Company.

Valves

Lunkenheimer Company, Lead Lined Iron Pipe Company.

Paint Spray-Brush Equipment

Simons Paint and Spray Brush Company.

Pumps

Barrett, Haentjens and Company, Dravo-Doyle Company, Deming Company, Harris Pump and Supply Company, Fairbanks, Morse and Company, John H. McGowan Company, Weinman Pump Manufacturing Company.

Cast Iron Pipe

American Cast Iron Pipe Company.

Loaders

Joy Machine Company, E. S. McKinlay Mining and Loading Machine Company, Myers-Whaley Company, Jeffrey Manufacturing Company, Simplex Loader of Pike County Coal Corporation.

Pulverizers

Raymond Bros. Impact Pulverizer Company.

Crushers

Gruendler Patent Crusher and Pulverizer Company.

Carbon and Metal Graphite Brushes

National Carbon Company, Inc.

Trolley Line Equipment

Ohio Brass Company, Electric Railway Equipment Company.

Cutter Chains

Cincinnati Mine Machinery Company.

Portable Power Pipe Threader

E. A. Kinsey Company, and Williams Tool Corporation.

Coal Men Who Were at Cincinnati

Pump Equipment

Driver-Harris Company ("Cimet" pump parts to prevent corroding).

Power Units

Ridgway Dynamo and Engine Company.

Drills

Chicago Pneumatic Tool Company.

Coal Washer

A. France Focquet (Rheo-Washer).

Mine Jacks

Templeton, Kenly and Company, Ltd. (Simplex Jacks.)

Safety Appliances

Mine Safety Appliances Company.

Automatic Register

Osbourne Register Company.

Control Equipment

Niles Bement Pond Company, Cutler-Hammer Manufacturing Company.

Asbestos Shingles

Johns Mansville Company.

Tipple

Allen and Garcia Company.

Mine and Mill Supplies

Phillips Mine and Mill Supply Company.

Roofing

Newport Rolling Mill Company.

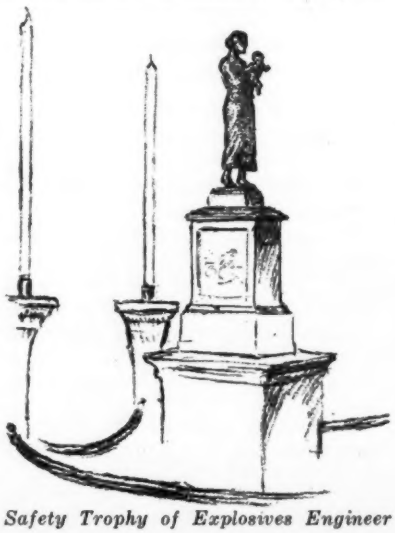
Steel Mine Timbers and Mine Rails

Carnegie Steel Company.

Many of the exhibits featured working models, or equipment in actual operation, among them being:

The new coal separator of the Frederick Iron and Steel Company; the Hazleton automatic centrifugal pump of Barrett, Haentjens Company; a complete tipple of the Sanford-Day Company; a pulverizing unit of the Raymond Pulverizing Company; complete pumping unit of Fairbanks Morse Company; a complete coal washery, featuring the Rheo Washer, of A. France Focquet Company; a complete substation of the Ridgway Dynamo & Engineering Company; Crusher of Gruendler Patent Crusher and Pulverizer Co., Wienman mine pump; Watt mine car; Harris Pump Company's mine pump; Automatic weigher of Streeter-Amet Weighing & Recording Company; the Austin Mine Pump shown by Dravo-Doyle Company; The Deming Mine Pump; a model of the pendulum hung crank driven shaker screen and tipple of Allen & Garcia Company who also exhibited a miniature model of their semi-automatic coupling mine car; the cutter bit sharpener of the Sullivan Machinery Company.

The automatic pressure greasing machine of the Lincoln Steel & Forge Company, who also showed their complete equipment of Journal Box trucks; a working model of the Heisler Locomotive of the Heisler Locomotive Works; the Automatic Reclosing Circuit Breaker of the Automatic Reclosing Circuit Breaker Company; a complete welding outfit was shown by the Una Bond Company.



Safety Trophy of Explosives Engineer

Among others exhibiting, but not exhibiting working models, were the Bethlehem Steel Company, who exhibited the Bethlehem solid manganese steel frog, steel mine ties, and the parallel throw switch stand; Morse Chain Company exhibited the famous Morse Silent Chain Drive; Keystone Lubricating Company had a complete exhibit of their grease; the Lorain Steel Company exhibited two complete mine cars; Concordia Electric Company had an interesting display of miners lamps; W. S. Tyler Company, exhibited their screen and the Delameter coal tester.

Wier Frog Company exhibited their frog and switch equipment; A rock dusting machine was shown by the Diamond Machine Company; Electric Railway Equipment Company, electrical equipment.

National Carbon Company, carbons and Graphite Brushes.

The monel metal mine pump was included in the display of John H. McGowan Company; Enterprise Wheel & Car Corporation exhibited mine cars; R. D. Nuttall & Company had an interesting display of gears; Westinghouse Mfg. & Elec. Company, their well-known equipment.

Hendricks Mfg. Company showed a complete line of screens; Rome Wire Company's exhibit consisting of wire rope, cord and cables; the Templeton, Kenly Company showed the Simplex Jack; Newport Rolling Mills—roofing materials; Driver Harris Company featured "Cimet" for use in mine pumps to prevent corroding; Cincinnati Mining Machine Co., cutter chains.

American Cast Iron Pipe Company, showed a complete line of their cast iron pipe; the Koppel Industrial Car Co. exhibited their pressed steel mine cars; Williams Tool Corporation, and E. A. Kinsey Company had a joint exhibit showing portable power pipe threader; Osbourne Register Company exhibited

their automatic register for use with script; Roebling's Sons had a complete display of wire rope; Electric Storage Battery Company, storage battery.

Du Pont Powder Company, Atlas Powder, Hercules Powder and King Powder Co., had exhibits of explosives; Chicago Pneumatic Tool Company—their drill; Carnegie Steel Company exhibited steel mine timbers and mine rails; SKF showed their famous ball bearings; Mine Safety Appliances Company's most interesting exhibit made a specialty of safety equipment; Goodman Mfg. Co. locomotive.

Tool Steel Gear and Pinion Co. Gears.

Lunkenheimer Company featured in their exhibit a large model of their valve, gilt plated, and encased in a huge frame, with interesting lighting effect; Waverley Oil Company had a complete exhibit of Waverley grease and oils; Hockensmith Wheel & Mine Car exhibited a mine car; General Electric, a mine locomotive; Hyatt Roller Bearing Company, roller bearings; Niles, Bement Pond Company, control equipment; Lead Lined Iron Pipe Company, lead lined valves, specially designed to resist the acid in mine waters; Koehler Mfg. Co., an induction motor; Bassick Mfg. Co. lubricating oils; Broderick & Bascom, wire rope; Cement Gun, a cement gun machine; Simons Paint Spray Company, paint spray brush equipment; Cutler Hammer Co., control equipment; American Car & Foundry, a mine car; Johns Manville Company, asbestos shingles and packing.

Mancha Storage Battery Company, a mine locomotive; Strom Ball Bearing Mfg. Co., ball bearings; Simplex Wire & Cable Co., wire rope and cables; Electric Railway Improvement Co., Arc Weld Rail Bonds, and electric welding machine; Hurlbert Oil & Grease Co., Red Devil grease; Jeffrey Mfg. Company, standard line Jeffrey equipment shown through photographs and movies; Philadelphia Storage Battery Co., storage batteries; King Powder Company, explosives; Central Frog and Switch Co., frogs, tracks, signals and switches; Mining Safety Device Company, Nolan automatic feeder; Ohio Brass Company, trolley overhead construction and standard OB equipment; Edison Storage Battery Co., model showing head lamps in mine, and complete battery equipment; West Virginia Rail Company, track equipment, switches, ties; Rail Welding & Bonding Co., Bonding and welding equipment; Bertrand P. Tracy, mining machine parts and mine supplies; Post Glover Electric Co., electrical equipment.

Officers of the Manufacturers' Division

An interesting and highly decorative feature of the exhibit was the beautiful new Safety Trophy of the Explosives Engineer, of The Hercules Powder Company. This trophy which is being given in connection with mine safety work, is made of bronze, depicts a miner's wife and child, and is called "Sentinels of Safety."

As an entertainment feature of the Exposition, a Smoker and Special Entertainment was held on the Roof Garden, of the Hotel Gibson which was attended by more than 1500 manufacturers and operating men. Little time however was given over to entertainment, as the sessions lasted but four days, and every moment was utilized fully in discussing practical operating problems, and inspecting the exhibits.

Topics discussed at the Cincinnati meeting that are not carried in this issue will be published in full in July and subsequent issues of THE MINING CONGRESS JOURNAL.

THE SOUTHERN INDUSTRIAL EXPOSITION

Creditable Exposition Held At Grand Central Palace, Showing Southern Resources

THE Southern Industrial Exposition which was held in the Grand Central Palace in New York City, May 11-23, was a very creditable first-effort to call to the attention of the North, the diverse products of the South. It was unfortunate for the completeness of the Exposition that a few states and railroads failed to participate, but far more unfortunate for them, that their resources missed this excellent opportunity of presentation.

The Seaboard Air Line Railway, and the Georgia and Florida Railroad had exhibits which would have graced an international exposition.

The power companies displayed a diversity of products manufactured by their customers, and made an impressive showing of the part which "white coal" plays in Southern industry. The Alabama Power Company in conjunction with the Alabama Polytechnic Institute, exhibited a model farm, with electric equipment throughout.

Paper making from southern pulpwood, Georgia kaolin, resin and limestone, was visualized not only by the materials themselves but by many photographs of the various stages of the process.

The Alabama exhibit probably offered the widest display of minerals, which were admirably arranged and indexed by class and source. The various coals, cokes and ores had separate booths, while the steel industry showed samples of its various finished products, and the art of steel making was illustrated by a series of paintings.

The exhibit of Dr. George W. Carver, Chemist, of Tuskegee Institute, attracted a continuous throng. His paints and dye-stuffs made from Alabama clays, his breakfast foods, medicinal and salad oils, starches, shoe polish, and an astounding array of by-products from sweet potatoes and peanuts, gave evidence of the remarkable genius of this leader of his race.

Another portion was devoted to Southern art, and a large collection of paintings of the famous Magnolia Gardens, near Charleston, S. C., graced the Exposition.

Louisiana made an attractive display of pottery, building lumber, agricultural products, (*Continued on page* 318)

CHANGED AND CHANGING ANTHRACITE CONDITIONS

Problems Of Anthracite Operators Call For High Type Of Executive Ability—Few Companies Earn Substantial Profits, And A Significant Portion Fails To Earn Adequate Return On Capital Invested

By E. W. PARKER *

IN a paper which I had the privilege of presenting before the annual convention of the New England Retail Coal Dealers' Association at Springfield, Mass., a few weeks ago I called attention to some of the changes that had taken place in the markets for anthracite during a generation—in the lifetime of many here present—how that product had entirely disappeared as a blast-furnace fuel, a use in which at one time it held first place, and how equally it had lost place as a fuel in ocean-going steamers. These constituted profitable and consequently desirable markets for the anthracite for these purposes was shipped in large lumps, the only preparation necessary being the separating of it from the slate and rock and the smaller sizes. However anthracite operators may have regretted the loss of these markets, they could not stop the march of progress, and as anthracite had been found a better fuel than charcoal for making iron and than wood for making steam, so when coke entered the blast-furnace field and the value of the high-grade bituminous coals from the eastern edge of the Appalachian region became recognized as a more efficient and economical fuel for high-pressure steam, anthracite had to do more than take a back seat—it left the arena altogether.

What has been generally known as broken coal, formerly quite extensively used in large hot-air furnaces for the heating of churches, stores and other large buildings, is still made, but only to a minor degree compared with 35 years ago. In 1890 the shipments of broken coal amounted to 4,657,000 gross tons, or 12.7 percent of the total of 36,600,000 tons, while in 1923, when the total shipments were over 73,400,000 tons, the shipments of broken coal were only 3,476,000 tons, or considerably less than 5 percent, and it was not used to any extent for heating purposes, but principally in the manufacture of water gas. Except for this slight hold as an industrial fuel anthracite has been practically driven out of that field. Notwithstanding the problems evolved as a result of these changes, I am inclined to believe and, in fact, have the temerity to state that it were better so. Though we be but of little faith we can believe that anthracite was intended by the Directing Hand for better things than the blast furnace and the steamboat, and that it has found its place and is now recognized as the one reliable, safe and fool-proof domestic fuel. But nature has a way of making men find out things for themselves, and the manner of finding them is not always easy. The problems the anthracite operators have been called upon to solve have demanded the highest type of executive ability. I am not going into the matter of engineering and operating problems, but should like to discuss with you for a few moments some of the economic questions that have arisen as the result of the changed and changing conditions.

The complete disappearance of the markets for the large sizes of anthracite has necessitated breaking them down in order to produce the sizes which the household market demands, Egg, Stove and Chestnut. Now what happens? If we go back again to 1890 we find that only about 10 percent of the shipments, some 3,750,000 tons, consisted of sizes smaller than Pea, whereas in 1923, the shipments of Buckwheat No. 1 and smaller amounted to over 21,000,000 tons. The total production had about doubled; the production of the small sizes had increased nearly six times.

It is true that in the early days, or at least until the early 90's, when the Coxe Stoker, after a decade of development and experimentation, discouraging at times, finally succeeded in making the small sizes of anthracite available as a steam raising fuel, they were deposited on the culm banks as waste. But a waste of 10 percent of the product was not such a serious item. A loss of 30 or 35 percent of the total production is a different matter. The anthracite operators never have been able to realize as much as labor cost on these sizes, which have had to be sold in competition with the more cheaply mined bituminous coal. In these days, with labor cost high as it is, the loss on the steam sizes becomes a significant matter. A conservative estimate puts the amount that the operators received for this portion of their product in 1923 at $75,000,000 less than it cost to produce it.

This loss is by no means evenly distributed over the entire region. Nature showed a little partiality in the distribution of the anthracite deposits. In the Northern or Wyoming district, for instance, where the beds lie relatively flat and at comparatively moderate depths, there is a much more abundant yield in the domestic or desirable sizes than there is in the Middle or Lehigh and the Southern or Schuylkill districts, where the beds have been subjected to greater folding and crushing stresses. These stresses have made the coal more friable, which results in a larger proportion of small coal than is produced in the Wyoming district, where the beds were not subjected to as intensive folding. Then, too, mining on the steep pitches naturally results in more breakage than results from the working of the flat-lying beds of the Wyoming region. In consequence of these conditions imposed upon the industry by the action of Nature we find that in the Northern or Wyoming district there are collieries yielding from 75 to 80 percent of the mine run production in the domestic sizes, whereas there are many colleries in the Lehigh and Schuylkill districts that do not yield more than 50 or 55 percent of domestic coal. I am not citing these figures as typical of the three regions, for there are many operations in the Northern field that do not make much better recovery than some of those in the other districts and, conversely, there are some collieries in the Lehigh and Schuylkill that will show a considerably higher recovery than 55 percent of domestic sizes. But the high recoveries are in the Northern district and the low recoveries are in the Lehigh and Schuylkill districts.

Now let us see how these figures show up in the realization of the companies operating under the extremes, and using an average of prices that were in effect during the last winter as reported in the trade journals.

Out of 100 tons of mine run coal coming to the breaker, one operation will yield:

75 Tons domestic, at an average price, say of $9.....	$675.00
and 25 tons small sizes, at an average say of $2.50.....	62.50
And realizes for its 100 tons..	$737.50

The other operation will produce

55 Tons domestic at $9.....	$495.00
45 Tons small sizes at$2.50...	112.50
And realizes for its 100 tons.	607.50

It can be seen from these figures that the more fortunately placed operators can realize $130 more for their 100 tons, or $1.30 a ton, than can their less fortunate neighbors and competitors.

In addition to these handicaps to realization the operators in the Lehigh and Schuylkill districts are at a disad-

* Director, Anthracite Bureau of Information. Address delivered at Cincinnati meeting Practical Operating Officials.

vantage in higher production costs, for mining on pitches of anywhere from 25 to 90 degrees is a different proposition from that of the flat lying beds of the northern district. The miner in the flat-lying beds is supposed to remove the slate and rock from the coal and dispose of it in the gob, where it serves a useful purpose of providing material for the support of the roof. It does not have to be hoisted and disposed of on the surface. In the steep-pitching beds, however, there is no way of disposing of the refuse in the mine and everything that comes down with the coal has to go up with it to the surface, and the refuse will amount to as much as 35 to 40 per cent of the material hoisted to the surface. The advantage possessed by the northern district over its southern neighbors is somewhat offset by the protection to the surface which the operators have to provide. In the Lehigh and Southern districts they have "crop falls;" in the northern district they have "mine caves," and as the coal beds underlie many communities of considerable size such as Scranton, Pittston, Wilkes-Barre, etc., protection to the surface is an important item of expense. Furthermore, protection must be given to the mining properties themselves where they exist in the broad valley of the Susquehanna River, where most of the overlying material is river wash, saturated with water and very unstable, and where a fracture of the roof would result—has resulted—in disaster.

No figures are available as to the actual differences in cost per ton in the different parts of the region, for while the United States Coal Commission made quite an exhaustive investigation of costs, margins and profits, and broke faith with the operators by publishing individual figures given it under the assurance they would be held confidential, it tabulated the results by "Railroad Companies," and "Independent Operators," and not by trade districts.

We will leave out of consideration then for the purposes of this discussion any differences in the actual cost of production between different companies or districts and consider only that $75,000,000 to which I have referred. It is evident that the greater part of this is borne by those companies that have the lowest realization in prepared or domestic sizes. It is a cost, whether much or little, that must be absorbed by these sizes. The late Mr. George F. Baer, during one of the many investigations to which the anthracite industry has been subjected, stated that the price of any commodity that is essential to the comfort or welfare of the people must be fixed by that portion of the product that it costs the most to produce.

It can be seen from the figures I have quoted that some more fortunate operators can make a substantial profit when others less fortunately situated can barely break even. Under normal conditions the entire output that the anthracite collieries are able to produce is demanded by the public. You cannot eliminate the higher cost or low realization operations and supply the needs of the anthracite consuming public by 50 percent. It is deducible from the reports of the U. S. Coal Commission that if the 60 cents a ton, which Governor Pinchot erroneously said would be added to the cost of the domestic sizes of anthracite by his gift of $30,000,000 to the mine workers in 1923, had been absorbed by the operators, 65 percent of the production would be mined at a loss.

And taken as a whole the anthracite industry is one of very moderate profits. There are a few companies that earn substantial profits. I deny that there are any that make exorbitant profits and there is a significant portion of the tonnage that does not yield an adequate return on the capital invested in it. The United States Coal Commission after an exhaustive investigation, found that in the ten years ending with 1922, which included the years of the World War, when profit making was the thing in other lines of industry, the anthracite industry had averaged less than 5 percent on the investment. The anthracite industry made no war time profits.

No one realizes more keenly than do the anthracite operators that the prices of the domestic sizes of anthracite are out of line, and that the substitution of other fuels for domestic use is encouraged thereby, particularly in the more distant markets, like New England, Canada, and the Northwestern states, where the cost of transportation adds a significant factor to the consumer's burden. In saying the prices of anthracite are out of line, I mean, they are out of line with the prices of bituminous coal and coke — not with oil, nor with the cost of production. The cost of labor in the anthracite industry is out of line, and is the principal item in the price the consumer of anthracite has to pay for his fuel. It is now three times what it was before the World War, while wages among railroad employes have increased 2.3 times; those in the building trades have doubled and the earnings of farm labor have increased 70 percent. Labor costs in other industries have receded since the war time peak. Not so anthracite. Every change has been the other way—upward. When we have a governor that enjoys piling Pelion on Ossa, when it comes to adding burdens to the producers and consumers of anthracite; when we have taxing authorities that are exercising every conceivable way to enrich their treasuries at the expense of the anthracite mines; when we contemplate a labor organization 100 percent effective in the anthracite region, and when we consider the really meager returns that the industry yields, we see little chance of relief unless we can do something to reduce that $75,000,000 loss that results from the sale of from 30 to 35 percent of the output. When the value of these small sizes as a domestic heating fuel gets its propor recognition—and it is along that line that the anthracite operators are bending much of their energies at the present time—and the red figures on the small sizes are changed to black. We will have accomplished something that will not only be of benefit to the industry but to the consumers of anthracite as well, as it will relieve the domestic sizes of a burden they should not have to carry and permit the bringing of the prices of those sizes more into line with those of other fuels with which they have to compete.

ILLINOIS COAL

THE Department of Labor has issued a report on the coal situation in Illinois which it says is a fair picture of the entire bituminous industry. "Illinois has a snowbird problem as great as any other state," the report says in referring to the fact that 694 of the 1,032 coal mines of Illinois are of the local or wagon mine type which do not ship by railroad. During the year ended June 30 last the local mines operated 140 days as against 139 days by shipping mines. Production of local mines is said to be insignificant, with no effect on competitive centers as they supply a local trade.

The report declares that 254 of the 338 principal coal mines in Illinois are unnecessary as they prevent an adequate number of mines from producing an adequate amount of coal on a reasonably efficient basis. Railroad and industrial mines are also regarded as important factors against commercial mines.

The Department says:

"When we say that we use 500,000,000 tons of coal in the United States we are creating a false impression. Considerably more than half of this consumption is not 'demand' in the market sense of the word, but is a demand that is already supplied by the very terms of the ownership and operation of the production."

Present methods of reporting the number of miners employed is said by the report to result in duplication. "There is actually no such number of individuals employed in bituminous mines in Illinois and it is impossible to determine from these figures the exact number employed," says the Department in referring to an Illinois report that there are 95,499 employed. The mine union membership in Illinois is said to be 90,000.

BITUMINOUS COAL INDUSTRY FACING BRIGHTER FUTURE

Operators Are Already Well On Their Way In Working Out The Gloomy Problems That Have Been Facing Them, And Nothing Can Be Gained In This Progress Through Regulation Or Supervision By the Government

By HARRY L. GANDY*

"*WATCHMAN tell us of the night — what the signs of promise are*"—are the first lines of a well-known church hymn. That the darkness of night settled down over the bituminous coal fields of this country is very generally agreed. Of course there are exceptions and I know the tendency of man to think that conditions are better over yonder, somewhere else, but my observation is that without regard to locality an unusually distressing condition has prevailed in this industry for many months past. Many other industries, including metal mining, if I am correctly informed, have had quite similar experiences. As a result of the unusual demand placed upon them by war-time necessities, the end of the war found them equipped with productive capacity in excess of peace-time requirements. Whatever peculiarity exists in the condition of bituminous coal mining arises from the comparative slowness with which the readjustment of supply to demand has taken place in that industry. Unquestionably there is the ability to produce more coal than can be marketed at a profitable figure. The fundamental cause of the situation now existing in the industry must be recognized to lie in the prodigality of nature, which has taken the form of immense deposits of bituminous coal, and the lack of foresight of man, which alone accounts for the too prevalent practice of operators of selling coal below cost.

The effect of these two forces is to be seen in the unprofitably low prices at which bituminous coal is selling. "Coal Age" average spot price has at no time during the current year been above $2.12 and for seven weeks was uninterruptedly below $2 a ton. In comparison with present costs of operation these figures represent the lowest price at which bituminous coal has ever been sold. The number of mines that can avoid losses in operation while selling coal at prevailing mine prices is extremely small.

It is one of the ironies of fate that bituminous coal operators generally, who are rendering society a service of inestimable value in the shape of a generous supply of cheap fuel, are themselves reaping no reward for that service, but at the same time they have been and are, on the contrary, the objects of much unmerited and uncalled-for criticism in the press and on the political platform. Whoever may be suffering under existing conditions in the bituminous coal mining industry it is certainly not the consumers of bituminous coal.

Some of the industries which were over-stimulated during the war have found their way out of the darkness in which the war left them through an increase in the demand for their products sufficient to employ their excess capacity, or through transferring their activities to other lines of endeavor. It is well known that a coal mine could not be changed to any other line of production, but why have not the troubles of the bituminous coal mining industry been relieved by an increase in consumption?

In seeking an explanation for this failure, the first thing to be noted is a fundamental fact about the market for bituminous coal. In the language of the economists the demand for that commodity is extremely inelastic; that is, at any given time the amount of coal that the country will absorb is pretty nearly a fixed quantity and even a change in price of considerable magnitude will have little immediate effect upon demand. Producers of foodstuffs, of boots and shoes, or cement or of lumber can always move surplus stocks and increase sales by lowering prices. Producers of bituminous coal have learned to their sorrow during the last two years that lowering the price of their product does not appreciably affect its market, for the years 1924, and 1925 to date, have seen low prices and low demand running neck and neck. In this connection it is noteworthy that years of high price, like 1920, have also been years of large production.

In the second place there has been in recent years a marked retardation in the growth of the demand for bituminous coal. By quinquennial periods from 1900 to date, the output of bituminous coal has shown a steadily declining rate of increase. During the first five-year period the increase was 37 percent; during the second, 18 percent, whereas during the last ten years the advance has been only 7 percent. In other words, the new productive capacity created by the war has been met by a steadily declining annual increase in consumption.

How is this falling-off in the rate of increase in the use of bituminous coal to be accounted for? It is not to be ascribed to any decline in the growth of power-using industries, for census figures, as well as common observation, indicate that the aggregate volume of industrial activity is on a high level. It must, therefore, be due to factors affecting the amount of coal used for power producing purposes.

These factors have been of two kinds: One, the use of substitutes for coal, and the other the more efficient combustion of coal. In the former group may be mentioned the development of hydro-electric power and the use of oil and gas in the place of coal. The extent to which coal has been displaced through these movements has been variously estimated at from 75,000,000 to 100,000,000 tons a year.

The falling-off in the demand for coal due to its more efficient combustion, while not as large as that caused by the use of substitutes, has been far greater than is generally realized. Without attempting to give the details, it may be stated that three industries alone—electric power companies, railroads and iron and steel plants—cut their annual coal consumption for a given amount of work by some 45,000,000 tons a year between 1919 and 1924 through more efficient combustion. Similar economies of great importance have been made in many other lines of industry of which no definite statistics are available. It is safe to say that in the aggregate the annual saving in coal consumption through more efficient utilization during that five-year period has amounted to 60,000,000 tons to which should be added the very considerable amount of coal that would have been burned by the railroads if they had been called upon to haul to market this additional 60,000,000 tons, and the coal lost to substitutes.

Another important contribution to the excess productive capacity must be briefly noted. While no satisfactory statistics are available by which the extent of the movement may be measured, the rapid improvement in mining methods and the extensive introduction of mining machinery, especially in recent years, of loading machines, have brought about a noteworthy increase in the productive capacity of the mines already existing. The effect of this movement has been to also expand the gap between coal producing capacity and coal consumption.

These are some of the explanations of the fact that there has been so little tendency for consumption of bituminous

*Executive Secretary, The National Coal Association. Address delivered at the Cincinnati convention of Practical Bituminous Coal Operators, under auspices of the American Mining Congress.

coal to overtake productive capacity. It is a situation in the face of which the bituminous coal operators have no remedy except that of "cutting their cost to suit their cloth." They must wake up, and they are waking up, to the fact that it is a suicidal policy, regardless of capacity, to attempt to market more coal than the country can absorb at a reasonable price. The inexorable force of the law of supply and demand is rapidly teaching them that lesson, and no combination even remotely approaching violation of the anti-trust laws, will be required to bring the industry gradually back to a profitable basis.

While the difficulties under which the bituminous industry is laboring are deep-seated, the most obvious effect of those difficulties is to be seen in the condition of financial embarrassment to which considerable attention is being directed today. It is no trifling matter for an industry of the magnitude and importance of the bituminous coal mining industry to find itself in that condition. The effects of such embarrassment are of course felt most acutely by the operators themselves, but they have a reaction upon many other lines of activity. Not only the industrial progress of the country, but the very life and health of its people are absolutely dependent upon a continuous and adequate supply of bituminous coal, while on the profitable operation of the industry depends directly the well-being of several thousand operators and about 700,000 employes.

Measured by the value of its product, the bituminous coal mining industry ranks among the foremost of the country. The last census of mines and quarries covers the year 1919. The value of the output of bituminous mining in that year was $1,146,000,000. According to the figures contained in the census of manufacturers for the same year, there were only 13 of the 350 groups of manufacturers recognized by the census in which the value of products exceeded that amount. Not only did it exceed the value of the products of any other branch of the mining and quarrying business, but, if petroleum is omitted from consideration, it was greater than the combined value of all other mining and quarrying activities including the mining of anthracite coal. That combined output amounted to $1,081,000,000 The value of coal was five times the value of iron ore produced in that year; six times the value of copper; fifteen times the value of lead and zinc; and seventeen times the value of gold and silver. In fact it was three and one-half times the value of the combined output of copper, lead, zinc, gold and silver.

I have called your attention to the fact that a great industry has been going through a period of distress. It is idle to speculate about the causes of that distress or the individuals who have been responsible for it, except so far as guidance for the future may be obtained from study of the past. Let us turn, then, from this rather gloomy picture of the immediate past to a consideration of the signs of dawn already appearing and of the steps that may be taken to hasten the approach of a brighter day.

In the first place, not in a perfunctory way, but from profound conviction, and speaking not as an official of an organization but as a citizen of my country, I want to express my deep-seated distrust of all projects for reforming this or any other private industry which involve bringing them under the supervision and regulation of bureaucratic governmental agencies. Such interference with natural law as is involved in the attempt to substitute artificial regulation for natural evolution can lead only to worse confusion and in the long run to greater loss to the industry and to society.

The source of the present agitation for government interference with the industry is to be sought in two directions: among politicians who think they see in agitation for that purpose a means of winning popular applause and officials who are always seeking pretexts for enlarging their field of activity. Some politicians have not discovered that the situation which led to the popular clamor against the industry in 1920 no longer exists. Government officials, with a keener realization of the altered relations of the people to the industry have shifted their basis for regulation. In 1920 they were deeply concerned because the public paid so much for its coal. In 1925 they are equally concerned because the operator is not reaping a satisfactory economic reward. In either case the one obvious remedy—as many officials view it—lies in putting the industry under his supervision and control.

If the existing depression in the bituminous coal mining industry is to be attributed to conditions that have carried prices below a profitable level, the plain remedy lies in the correction of those conditions.

I have already pointed out that there is now and always has been what is called excess capacity in the bituminous coal mining industry. I may add that in my judgment there always will be and always should be such excess capacity. It is a characteristic feature of a healthy growing industry under competitive conditions. The real problem confronting us is not how to get rid of excess capacity; it is rather how to live and prosper with excess capacity. That that is a problem not incapable of solution is clearly shown by the record of many other industries in a similar condition.

There are some signs of promise in that the rising price of oil is slowly but surely eliminating it from competition with coal in certain heating and industrial uses. There is a limit to the economies that users of coal may bring about through more perfect combustion. The hydroelectric field also has its limitations. Thus there are indications that the growth and development of the country generally will in time be more correctly reflected in the rising curve of bituminous coal production than has been apparent through the past 20 years.

I do not believe that the solution of our present difficulties will necessarily take the form of reducing output. It may well be doubted whether the amount of bituminous coal purchased by consumers during the current year, for example, would have been reduced by so much as 1 percent if the prevalent price had been high enough to yield a reasonable return to the industry. The real problem then reduces itself to this: What arrangements can be devised which will prevent the price of coal from falling below a profitable level?

The problem is complicated owing to the fact that the cost of operation varies very much from company to company and from mine to mine, due to different natural and artificial conditions of operation. It is necessary, therefore, to define a profitable price not as one which will yield a profit to every coal mine in operation, including the most costly, but rather as one that will enable operators to place on the market all the coal society demands without incurring loss on any material portion of the industry.

When the problem is thus defined the answer becomes sufficiently obvious. Whenever operators acquire sufficient courage and self-control to resolve that no coal shall go out from their mines at an unremunerative price, our difficulties will be over. Something can be done to relieve the situation by special measures, such as abandoning the suicidal practice of shipping coal unconsigned, or permitting and encouraging consolidations similar to those authorized and ultimately to be required among the railroads of the country, which present a similar problem of unequal costs of operation, but the complete cure can be attained only by converting the individual operator to sound financial principles. There are many indubitable signs of the return of operators generally to financial sanity, and on those signs I base my confidence that the industry is approaching the dawn of a brighter day.

I began my remarks by recognizing the fact that the bituminous coal mining industry has been going through a gloomy period. I registered my protest against any attempt to thrust upon it regulation or supervision by governmental agencies. I have pointed out that the industry is (*Continued on page* 316)

THE COAL INDUSTRY AND THE INVESTING PUBLIC*

The Coal Industry Controls, Produces, Prepares And Markets A Commodity Essential To The Life Of The Nation, And Thus Possesses In A Marked Degree An Element Which Appeals Strongly To the Investor, Yet The Public Is Loath To Invest In Coal Securities

By J. Ernest Allen†

I SOMETIMES wonder if you gentlemen of the coal industry yourselves realize how vitally important a part of the world's work you are doing.

You normally employ about 750,000 men, or twice the number employed in the iron and steel industries.

In 1922 your product, coal, comprised about 47 percent of the total tonnage hauled by the railroads of the country.

Of the entire world's normal output of coal, the 5,500 mines of this country produce about 45 percent.

It is estimated that the mine track mileage of this country totals about 200,000 miles, as compared to 400,000 miles of railroad trackage. Of this 200,000 miles of mine track, 50,000 miles are electrified, thus comprising an electrified mileage equal to the combined electrified mileage of all the street railways, interurban railways and standard railroads of the country.

Some one has aptly said that a nation's per capita consumption of coal can be regarded as a direct index of the degree of its civilization. If this be the case, the strides we have taken during the last 85 years may be measured by the fact that in 1840 our per capita coal consumption was only one quarter of a ton, while in 1919 it had increased to 6¼ tons. These figures should convince the most skeptical that we are rapidly becoming a civilized nation. Coal is certainly the basic foundation of our prosperity. The very steel industry itself, so often referred to as the backbone of our nation, could not exist without it.

These facts are well understood by investment bankers, many of whom have made a close study of the industry and follow its economic trend with keen interest. As a matter of fact, there are many attributes of the coal industry that attract the attention and compel the deep interest of the investment banker.

In any discussion of the topic which has been allotted to me it is obvious that a distinction must be made between the anthracite and bituminous coal industries. The coal deposits throughout the anthracite region being relatively identical in character and being confined within a small and compact area possessing great geographical advantages, its reserves of recoverable coal as well as its productive capacity being distinctly limited, and the fact that about 70 percent of its output is used for domestic purposes—these factors, combined with others, differentiate the anthracite industry sharply from the bituminous. In the course of this discussion it should be understood that, while certain of my remarks apply equally to both industries, many of them are pertinent to the bituminous industry alone and should be construed accordingly.

The business of an investment banker is to supply the public with sound securities for investment. The coal industry controls, producers, prepares and markets a commodity essential to the life of the nation, and it thus possesses in marked degree one element which appeals strongly to the investor. And yet, painful as is the reflection to those of us who are interested in coal mining, the public is loath to invest in coal securities, and only a very small percentage of the two to three billions of dollars annually invested by the American public finds its way into the treasuries of coal companies, a percentage entirely incommensurate with the relative importance of the industry.

Before you indict the investment banker for this fact, I want you to remember what his functions are. Investment bankers are primarily merchants who stock up only such goods as they can sell, and, like other merchants, can operate profitably only by rapidly turning over the goods upon their shelves. Hence, we must not only consider the inherent safety of any given security before we purchase it, but we must ask ourselves the question, "Can we sell it, or will we be obliged to carry it for a more or less indefinite period as a frozen asset?" It is perfectly true that within certain limits our customers accept and act upon our advice as to the investments they make, but we encounter great difficulty in overcoming the sales resistance of an investing public imbued with a fixed distrust of any given industry. We find, as regards coal securities in particular, that only the issue of large and long established companies with exceptional records as to earnings are at present looked upon with any degree of favor.

The reasons for this attitude on the part of the investing public are not far to seek. The vitally important part your industry plays in the world and the very direct contact it has with most of the householders of the country naturally cause you to receive much attention at the hands of the public press, through which the public at large has received certain fixed impressions, some true and some erroneous. Your labor difficulties have, as you know, received great publicity, and the public is not altogether uninformed as to the irregularity and spasmodic character of your production, as to the unfortunate interruptions to your car supply and as to the important fact that the developed production of your industry has for outstripped the normal demand of the country for your product. The banker, with better facilities for securing exact information than the general public, can perhaps better appreciate not merely your problems but the efforts being made to meet them.

Several phases of your industry particularly interest us.

It seems to us that you are plagued as an industry with too many small and ill-equipped operations which shut down when the market for coal is low but are reopened at every period of increased demand. They flood the market with ill prepared coals which they sell in competition with your superior products at prices which frequently bear no relation whatever to their costs of production. In fact, they are themselves, as a rule, profoundly ignorant of what their costs are. If the industry in some way could purge itself of such undesirable producers, and if it could be guaranteed as well against any further increase in its productive capacity until such time as the normal consumption of the country has grown sufficiently to catch up with it, the financial standing of the industry would improve immeasurably by reason of the far greater degree of stability it would attain. These difficulties are, I think, generally recognized throughout your own industry as one of the principal causes of the lack of popularity of coal securities.

With respect to modernization of plant and equipment, most bankers feel that in such a highly competitive industry as coal mining, they can only consider the financing of properties which are adequately equipped with the most up-to-date plant and machinery. Large units so equipped make for low costs and a better prepared product, and low costs and a well prepared product make for steadier production and greater profit. The trend toward such large, well equipped units will, we believe, eventually play an important part in the elimination

*Address before Cincinnati Convention, Practical Coal Operating Officials.

†Hayden, Stone & Company.

of that element which I have referred to as one of the plagues of your industry, the small, irresponsible mine.

One is struck by the fact that the largest unit of your industry, by which I mean that group of mines under one control which has the largest output, produces only about 3 percent of the total output of the country, the balance of production, 97 percent, being divided among some four thousand or more different interests. This fact, and an analysis of the character of many of the units of your industry, lead us irresistably to certain conclusions. We believe that the logical solution of most of your problems will be found in consolidations, in the gradual merging of the innumerable smaller units of your industry into a reasonable number of large, highly organized units. The advantages to the industry itself of such mergers, when wisely made and soundly financed, can hardly be overestimated. The large unit can afford to employ the highest technical skill, which the small unit usually cannot; it has financial strength sufficient to moderniże its equipment and reduce costs; it can confine production, in times of lax demand, to a few collieries operating fairly steadily, reopening its closed mines only as the demand for coal justifies. It can effect great savings through the standardization of equipment, through centralized purchasing and through the elimination of much administrative overhead. And last, but by no means least, such mergers will go a long way towards curing the overproduction evil and toward ridding the industry of the unfair, cut-throat competition of irresponsible operators.

Such a proposal as this involves no conflict with the wise laws of our country designed to prevent combinations in restraint of trade. Reasonable competition is desirable. Mergers such as I have in mind, capable of effecting every benefit I have named, could be carried out in practically every field in the industry and still result in a large number of competing corporations entirely within the law.

The development of such mergers should be gradual and should proceed along natural lines,—that is, with combinations of properties located in the same fields, whose problems are similar and whose geographical locations with respect to one another point clearly to the unmistakable advantages to be derived from unified and consolidated acreages. Whether such relatively small local mergers can later be combined with others, with advantage to the trade and to the public, can well be left to the future, when experience will point the way.

The soundest kind of a merger will be that effected without calling upon the investing public for financial assistance. It will be one where the controlling interests of the various properties to be consolidated have sufficient vision to see the great benefits to be derived, sufficient broadmindedness to be willing to surrender a little of their independence, and where each has a sufficient sense of fairness to concede the equitable value of his neighbors' properties as well as to admit a reasonable value for his own. It will be a consolidation effected by the owners themselves, each taking such proportion of the issued stock of the consolidated corporation as the value of his property and business bears to the total. The banker will be glad to lend all the assistance in his power, and can be of real value in suggesting sound plans of capitalization, and, perhaps, in bringing harmony out of conflict.

I recognize that such financially self-contained mergers cannot always be accomplished. At times it is necessary to refund the indebtedness of some proposed constituent company. In such cases it is often essential that some public financing be done. Wherever possible, such financing should be in the form of stock,—not bonds. On account of the highly fluctuating nature of the coal industry, fixed charges snould be avoided wherever possible. Many a coal enterprise, which, had it been soundly financed by stock issues could have outlived the storm, has been wound up by foreclosure because in a dull coal market or strike period it could not meet the interest and sinking fund payments of its bonded debt. Bond issues should be resorted to only as a last expedient in the financing of coal properties. They should seldom be issued in excess of 40 percent of the reasonable value of fixed assets, and order for them to be saleable today a long record of satisfactory earnings is absolutely essential. The proper safeguards for the investor, which should attach to an issue of coal bonds, and the many factors which determine them, have been the subject of careful study for many years by investment bankers who specialize in such securities; but such considerations, important though they be, I have not considered germane to my more general topic.

Before closing may I suggest that, if and when you need to consult an investment banker, you select one who has knowledge of your industry and experience in the handling of coal securities. There are many such. Then, after you have picked your banker, be absolutely frank with him; lay every card upon the table. If he is to help you he must have all the facts. He cannot work without tools, and facts are his tools. Do not be afraid that what you tell him or the figures you give him will be betrayed to others. I am proud to be able to say of my calling that probably no other class of business men are so continually entrusted with such important confidences, and that none have better deserved the faith thus placed in them.

And one other thing, when handling an issue of your securities the banker must see to it that such securities are properly safeguarded; he owes that duty to his customers. But he does not want to run your business, or in any way to have a hand in the running of it. His business is banking,—not operating coal mines. He knows the former and is satisfied to stick to it.

In closing, I want to express my appreciation of the opportunity to address you and to thank you for your attention.

A special examination for fire bosses, assistant mine foremen and mine foremen will be held at Carnegie Institute of Technology in Pittsburgh by the Pennsylvania Department of Mines on July 15, 16 and 17.

The special four-weeks' summer course for young coal miners given by Carnegie Institute of Technology in cooperation with the Pittsburgh Experiment Station of the U. S. Bureau of Mines will open on June 15. The course, according to an announcement, prepares miners for the examinations of the State Department of Mines for positions as fire bosses, assistant mine foremen and mine foremen. A certificate will be awarded by the Carnegie Institute of Technology and a Mine Rescue and First Aid certificate will be awarded by the U. S. Bureau of Mines to the graduates.

A recent statement by the Department of Commerce shows that the United States in 1924 bought practically the entire output of Chinese tin. Of the 4,807 long tons of tin shipped, 4,627 tons came into the United States. The value of the tin shipped to the United States is estimated at $3,819,698.

Club House, Church and School at Starritt, W. Va., Main Island Creek Coal Company

MECHANICAL LOADING AS DISCUSSED AT CINCINNATI MEETING

The Possibilities Of Mechanical Loading As One Way Out Of The Present Depression In Coal Mining Discussed By Practical Operating Officials—Experiences At Various Properties Given—A Review Of Mechanical Loaders In Use Today

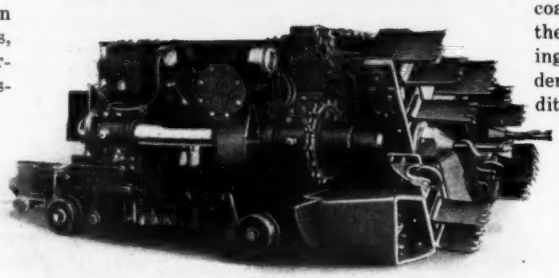
MECHANICAL LOADING in all of its phases was one of the major topics for discussion at the convention of practical operating officials which was held in Cincinnati, Ohio, during the week of May 25. Serious consideration of this important phase of cost reduction led to not only timely papers presented by experienced operators, which dealt with actual experiences with mechanical loading, but brought out through the informal discussions things of utmost importance to the operator who is contemplating the installation of mechanical loading equipment.

Eugene McAuliffe, President, Union Pacific Coal Company, Omaha, Nebr., acted as chairman of the sessions devoted to this discussion, and in presenting the subject said:

"As I understand the situation, the industry is very generally agreed that it is both overmanned and overdeveloped. Yet withal, new development is taking place, even though mines within the same field are being closed for want of market. Years ago a man then prominent in the industry, now gone, predicted at intervals the doctrine of 'The Survival of the Fittest' as a solvent that would at some time cure the ills of the coal industry. That such did not take place in his life time was due to two things, i. e., that either a railway transportation shortage or a protracted suspension of work invariably appeared on the horizon in the nick of time to lift the victim from her perilous position before the buzz saw caught her. These two rescuers have apparently gone their diverse ways. It is not probable that a grave transportation shortage will ever be experienced in this country again, and likewise the theory that a great basic industry like coal must not be distorted into an instrumentality for the punishment of those who maintain it is well fixed in the minds of the American people.

"Much has been said in the past seven years as to the necessity of composing and stabilizing the coal industry and either consciously or unconsciously much has been done in that direction. The coal industry is a 'state of mind' rather than a business, and seemingly our minds are actually undergoing changes. Mr. Carl Snyder, Statistician of the Federal Reserve Bank of New York, in the June Harpers Monthly, under the caption, 'Preventing Business Depressions and Booms,' says:

> "One thing that is quite new and definite is the proof that our modern industrial civilization is not going to the bow-wows any more than it is being destroyed by the foolish 'class wars' of Karl Marx and his followers; but is steadily growing more stable, and more efficient, meaning thereby that the average livelihood is becoming surer and the chances of starvation, even for the most poorly equipped members of society, growing less, and that we may confidently look forward to a day when what we call poverty will be practically extinct."



Coal Mining and Loading Machines. Above—Joy. Below—McKinlay

"Mr. Snyder further on in this highly informative article makes use of a statement that gets very close to the nub of the present day coal problem, when he says:

> "If every business man were fully informed of the facts which are now available, the chances are large that we should have no such wild booms as we have had in the past and even as late as five years ago. And with no booms—no depressions and no hard times. * * *
>
> "We have now, it would seem, a very simple and almost automatic safeguard against these periods of excessive optimism and over-expansion and consequent overproduction—if our business men can be familiarized with the new knowledge which we now possess."

"Economists are likewise now asking the Railway executives why it is necessary to secure delivery of equipment, in certain years, in numbers ranging from in the case of locomotives, 41 to 175 percent; of freight cars, 31 to 167 percent; of passenger cars of 19 to 186 percent; of the average delivery for a period of 18 years, with resultant bad effect expressed in irregular employment of labor and an enforced impossible load factor imposed on the steel, coal and allied industries. In substance, strong forces are being exerted in the direction of equalizing our whole industrial load through not only yearly but monthly cycles, and while perhaps we of the coal industry have not yet sensed the fact, the 'doctrine' I have referred to will be made effective, in the case of the coal industry, through enforced operating economies, the greatest of which lie in the direction of mechanicalization. Reduced to the fewest words—when in the past a wave of depression overtook the coal industry, the difference between the lowest and the highest operating cost properties were those incident to differences in physical conditions, such as thickness and quality of seams, character of management, etc. We now have the same differences accentuated by higher wage scales plus the possibility of mechanicalization or nonmechanicalization. Therefore, we may assume it to be self-evident that the producer who has the courage and the capital to mechanicalize his properties will be 'among those saved,' while those who fail to do so will be among the missing.'

"Much has been said and more passes unuttered through the minds of coal mining operating officials as to the attitude of mine labor toward mechanical loading. To those who see opposition to such, I commend a careful reading of the full face headlines shown on page three, as well as the editorial captioned 'The Blind Fiddler,' on page six of the Mine Workers Journal of May 15, 1925. Some of us (at least those who yet em-

ploy union labor) cannot fail to sense in the two last mentioned articles a challenge toward greater operating economies, and mechanical loading, with the translation of men employed as laborers into mechanical operatives with a marked reduction in the number of men employed, plus the savings that will accrue from smaller areas more intensively worked, more easily ventilated and maintained, seems to be not only the one best bet, but the only bet that the bookmaker, 'free competition,' offers the industry. The shift from the unlimited use of the shovel to mechanical appliances does not savor of the revolutionary; other like industries have taken the leap, we can do likewise if we so determine.

"The coal mining industry like other similar industries owes a tremendous obligation to the manufacturing industry, to the engineers who design and develop and to the manufacturers who, thereafter, manufacture, experiment with, educate the public to, and eventually, often at cost of hundreds of thousands of dollars, put on the market successful devices."

UNDERGROUND LOADERS IN USE TODAY

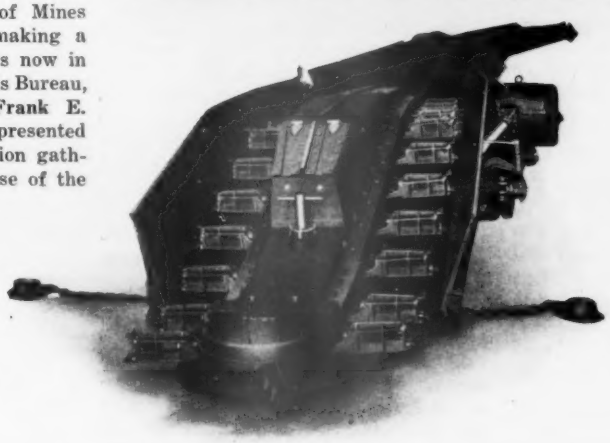
The United States Bureau of Mines for many months has been making a study of the mechanical loaders now in use in the coal industry, and this Bureau, through its representatives, **Frank E. Cash**, and **E. H. Johnson**, presented to the convention the information gathered by the Bureau. This phase of the discussion was illustrated by lantern slides. Mr. Cash opened his remarks with the statement that:

"With the general increase in the use of mechanical devices of all kinds in coal mining, there has grown an interest in the problem of mechanical handling of coal between the working face and the mine car. In the past, labor has been cheap and represented practically no investment of capital on the part of the mine management. This together with the lack of keen competition has held back the normal development of machinery at the face. Manufacturers have complained that for years it has been possible to design and build machinery for this purpose, but operators have not been interested. Because of shortage of labor and the sharp competition that developed when the war demand for coal fell off, the interest of operators developed almost overnight.

"Such a rapid reversal of position on the part of the operators led to a mushroom growth of the idea that had been waiting for encouragement. It seemed that at once everybody had the new idea that was to revolutionize the industry. This reaction was not surprising, as the labor that was to be replaced by machines constitutes not only the most difficult work but also the largest single item of expense in the production of coal.

Cooperative Agreement for Investigation of Loaders in Use

"It was through a cooperative agreement between Carnegie Institute of Technology, United States Bureau of Mines and Advisory Board of Coal-mine Operators and Engineers that an Investigation of Underground Coal Loading Devices was undertaken. A fellowship problem evolved with Edwin H. Johnson as Research Fellow and Frank E. Cash as Senior Investigator, the results of which will be published in the near future under the subject 'Mechanical Loading in Coal Mines.'



Coal Mining and Loading Machines. Above—Jeffrey "Shortwaloader." Below—The Coloder

Purpose of Investigation:

"The purpose of this investigation was to make a survey of the various types of machines that are in state of development and that have been developed to a producing stage, with a view of ascertaining the conditions under which such machines may be used to economic advantage. This will naturally depend largely upon the method of mining employed where such machines are used. Equipment of a mine already developed and producing presents a different problem from the equipment of a new mine. The answer to the two cases may be widely different, even where the natural conditions are the same.

"We must and do concur in the oft expressed opinion that there is no single system which has been or is likely to be developed that will prove a universal solution to the mechanical loading problem. There are too many variables involved to make it feasible to meet them all with one machine.

Scope and History of Previous Investigations:

"In order to obtain a comprehensive perspective of this problem it was decided to make a survey of mechanical handling of coal in the bituminous and anthracite fields of the United States and inspect as many operations as possible, where mechanical methods were in use. From this it was hoped to obtain data on practically all the mechanical loaders in actual operation. Such a program would permit the observation of these machines under a variety of natural conditions, and would give also the benefit of the experience and opinions of the most progressive of the coal operators. From these operators we have received unfailing cooperation and courtesy which is gratefully acknowledged. It has not been possible in the time allotted to complete this investigation so this work is to be supplemented by further study during the years 1925-26 under the direction of the U. S. Bureau of Mines.

Conduct of this Investigation:

"The fields covered by this investigation include the following: Anthracite and bituminous of Pennsylvania, Ohio, West Virginia, Virginia, Kentucky, Indiana, Illinois and Wyoming.

"Consulting engineers in various parts of the country have been visited and inspection trips made through 11 of the plants manufacturing coal handling machinery. Thirty-five types of machines have been examined in visits to 64 mining operations in the fields mentioned.

"These are:

1. Hamilton Loader
2. Jeffrey Entry Drive
3. Jeffrey Shortwaloder
4. O'Toole Cutting and Loading Machine
5. McKinlay Mining and Loading Machine
6. Joy 4-BU
7. Joy 5-BU
8. Joy 6-BU
9. Coloder
10. Meyers-Whaley
11. Oldroyd Leader
12. Riley Mine Car
13. Stockley Loader
14. Goodman A Scoop
15. Goodman Entry Loader
16. Ace Coal Loading Machine
17 Jeffrey Pit Car Loader
18. Movor Conveyor
19. Fairmont Conveyor
20. Jeffrey Sectional Conveyor
21. Jeffrey Portable Conveyor
22. Jeffrey Longwaloder
23. National Long Wall Shaker Com.

"Certain other machines are not described because the manufacturers requested that publicity be withheld. These are machines that will soon be on the market but are now in the experimental stage of development."

Mr. Johnson then took up the discussion, illustrating his remarks by lantern slides, of the equipment. The first machine to be described was:

HAMILTON LOADING MACHINE

"The Hamilton Loading Machine was developed about 20 years ago by W. A. Hamilton, of Columbus, Ohio. The machine at that time was able to load coal at the rate of 80 tons per day. This machine was first brought into the field in Southern Illinois. Later another machine was put in which loaded 150 tons per day. The miners at that time objected and demanded the hand loading scale for machine loaded coal, which was refused by the operator. The result was a strike which lasted a year. There followed an explosion in the mine which put men and machine out of business and the losses experienced by the company together with the attitude of the miners killed the chance of further development.

JEFFREY ENTRY DRIVER 34-B

"The first of the entry driving machines to make a success was the 34-B Entry Driver built by the Jeffrey Manufacturing Company. These machines have been in operation since 1921. The 34-B mines the coal without shooting. The machine slides forward on a pass into the coal. A horizontal cutter chain cuts the bottom and two vertical sheares cut vertical cuts 5 feet apart and 4 or 5 feet high at the same time. A powerful ram operates inside the enclosure. This breaks down the coal onto the conveyor which is thin enough to enter the kerf of the undercutting chain. The coal is conveyed to the rear of the machine and discharged into a swinging rear conveyor which loads the mine cars. After the first cut is made, which requires about 20 minutes, the machine returns and cuts with one vertical chain idle, on the open end. Successive cuts are made to produce the desired width of entry.

O'TOOLE'S CUTTING AND LOADING MACHINE

"The O'Tool Cutting and Loading Machine is experimental, and was developed by the company and operated in the Gay No. 6 Mine of the United States Coal and Coke Company. It was first placed in operation in the fall of 1923.

"Specification and requirements:

Cutting bar, 45 feet long.

Conveyor, drag flight, mounted within the path of the cutter chain.

Length, 60 feet.

Width, 18 inches.

Height at face, 4 inches; "at discharge to suit mine car."

Power, 60 to 75 Horsepower; direct current electric.

Roof support, Hydraulic jacks.

Coal face should break down as coal is cut.

"The O'Tool Cutting and Loading Machine cuts a rib of 42 feet 3 inches long and consists of a long cutter bar, tilted at a small angle, so that the cutter bits clear base plate on return pass, extending the full length of the rib and in front of the machine. Back of and parallel to the cutting pass of this cutter bar is a low drag type flight conveyor extending the full length of the machine and elevating on the front end to load direct into a mine car. On the back of the machine is a line shaft, driving a set of room gears which in turn drive the feed screws, which provide a forward feed of 2 inches per minute. The advancing screws pass through the swivel on the front face of the basis of a row of hydraulic jacks, which support the mine roof. The conveyor is designed to pass under the edge of the kerf just behind the cutting pass of the cutting chain. The setting of the roof breaks down the face of the coal onto the conveyor as the cutter chain advances.

McKINLAY MINING AND LOADING MACHINE

"This machine has been on the market for about two years, being first installed in 1922 or 1923. The improved type is adjustable to variations in height of seam and is being used with much success in the Harlan field of Kentucky.

Length, 15 feet, approximately.

Width and height adjustable to seam, 3 to 7 feet of coal.

Weight, 15 tons, approximately.

Power, 50 horsepower, direct current.

Power consumption, two and one-half tons.

Feed, hydraulic ram 3 inches minute.

Cutting, two tool holders which cut parallel bores and cutter chain.

Conveyor, drag type flight conveyor, discharging onto separate conveying unit, which in turn loads mine cars.

Crew, two men.

"The McKinlay machine mines the coal and conveys it from the face in one operation without the use of powder. Two overlapping circles are cut by motor-driven tool holders by a series of narrow concentric cuts in the face. In order to smooth out the triangular segments remaining at the top and bottom, a cutter chain follows at a close interval and removes these by overcutting at the top and undercutting at the bottom. The guides carrying these cutter chains form wedging plates which break the coal up or down. When the kerfs are cut to a proper depth an adjustable wedging roller mounted on the cutter bars enters the kerf forcing the coal apart until it breaks and falls as lump in front of the machine.

"As the coal comes down it is conveyed to the rear and loaded at a point distant from the machine.

"An adjustable forward feed is furnished by a hydraulic ram anchored against the ribs or roof behind the machine. A straight entry is driven, which is oval in shape and provides good protection against bad roof without any timbering.

JOY LOADERS

The first Joy loader was placed in operation sometime in 1919, and the first 4-BU machine in 1922. The type 5-BU was placed in operation early in 1924 and the Type 6-BU later in the same year.

"Specifications and requirements:

4-BU LOADER

Gauge, any gauge, 42 inch minimum for removable track wheels.

Length, 22 feet.

Width, 5½ feet.

Height, 42 inches (on caterpillar tread).

Weight, 3½ tons.

Power, 15 horsepower, direct current electric.

Gathering, two arms which sweep coal onto elevating conveyor.

Conveyor, single dray type flight conveyor, self-propelling.

Mechanism, 2 caterpillar treads and demountable track wheels.

Crew, two men.

5-BU LOADER

Gauge, any gauge, 42 inch minimum for removable track wheels.

Length, 22 feet.

Width, 6 feet.

Height, 48 inches on caterpillar tread.
Weight, five and one-half tons.
Power, 20 horsepower, direct current electric.
Gathering, two arms which sweep coal onto elevating conveyor.
Conveyors, elevating conveyor and rear conveyor which swings through 180 degree, each equipped with dray type flights.
Self-propelling mechanism, two caterpillar treads and demountable track wheels.
Crew, two men.

6-BU LOADER

Same as 5-BU, except it has no swinging conveyor, is 6 inches lower and one-half ton lighter in weight.

"The Joy Loader is self-propelled and travels from place to place on trackwheels. It is unloaded onto its caterpillar treads in the working place and maneuvers about on the mine floor, keeping the discharge end of the conveyor over the mine car. In coal less than 60 inches high the swinging rear conveyor type must be replaced by the single stiff conveyor type, which will operate successfully in 50 inches of coal. The front apron and the rear conveyor are raised and lowered by hydraulic jacks. Forward and rear movements of the caterpillars can be made without interrupting the conveyor or gathering mechanism.

Coal Loading Machines. Above—Goodman Entry-loader. Center—Ace Loader. Below—Myers-Whaley Shoveling Machine.

COLODER

"The original Coloder was invented, designed and built in 1893. The first modern Coloder was installed in 1918.

Specifications and requirements:
Gauge, 36 inches, minimum.
Length, 29 feet.
Width, 8 feet 6 inches.
Height, 42 inches above the rail.
Weight, 14 tons.
Reach, 12 feet from track center.
Power, electric, direct, any voltage.
Power plant, three reversible motors and controllers.
Conveyor, made to suit the mine car.
Wheel Base, 60 inches.
Crew, three or more men.

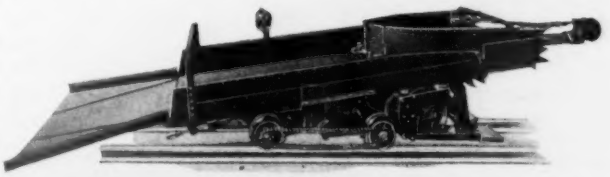
"The Coloder will enter the working place at three miles per hour under its own power, but generally a locomotive is used to save time. When the coal pile, which has been previously prepared, is reached, the gathering conveyor is unloaded from its pony trucks, the extension tracks and jacks are unloaded and the cable connected to the power line. The gathering chain is started and loading is begun with a forward motion into the pile of coal. By the time the machine has advanced a few feet one jack is set near the rib and close up to the coal pile and the gathering conveyor moves across the face toward the jack which has been put in place. By the time the gathering conveyor reaches the rib, the jack on the other side has been set and the motion is reversed; upon reaching the second rib and on each rib thereafter until the place is cleaned up, the machine advances. The coal is gathered into the conveyor by arms on the loading chain, elevated and dumped into the hopper of the car-loading conveyor and thence into the mine cars.

MYERS-WHALEY SHOVELING MACHINE

"The Myers-Whaley Company has developed three or more sizes in practically the same type machine, the smallest of which will be briefly described and is known as Special No. 3. The first machine was installed in a coal mine in 1908.

Specifications and requirements:
Gauge, 20 inches (balance rails on 40 inches or less).
Length, 24 feet.
Width, 4 feet 8 inches (5 feet at operator's platform).
Height, 3 feet 9 inches above rail.
Weight, seven tons (13,500 pounds).
Reach, 9 feet from track center.
Power, electric (or air).
Power plant, 1-15 horsepower motor.
Conveyor, 7 feet 7 inches overhang.
Wheel base, 36¾ inches.
Crew, two men.

"The Special No. 3 is self-propelling, and immediately after entering a working place after the coal has been prepared it is ready to commence loading. This machine consists of a primary and secondary shovel, an intermediate and delivering conveyor.



"The primary shovel goes under the coal, secures its load and with a reciprocating motion both shovels start up depositing the load into the secondary shovel, which turns it back into the intermediate conveyor, the secondary shovel dropping back into the primary ready for another loading.

"The intermediate conveyor deliverers the coal onto the rear conveyor, which in turn delivers it into the mine car.

OLDROYD COAL LOADING MACHINE

"The first Oldroyd loading machine was put into operation in a commercial coal mine in 1923.

Specifications and requirements:
Gauge, 36 inches, minimum.
Length, 42 feet.
Width, 5 feet.
Height, 54 inches from top of rail.
Weight, 25 tons.
Reach, 11 feet from track center.
Power, electric, 250-500 volt, direct current.
Power plant, 2-25 and 3-7-½ reversible; 1-25 and 3-7-½ nonreversible.
Conveyor, three 36-inch flight conveyors.
Wheel base, two sets trucks 24 inches, 15 feet centers.
Crew, four men.

"This machine is self-propelled by one 25 horsepower motor on each set of trucks and travels from 2 to 6 miles per hour. It consists of a forward conveyor with a dipper head, an intermediate conveyor and a rear conveyor. The

dipper is driven by a motor through two shafts and two cutter chains, one on either side, revolving upward away from the face. This head delivers the coal on the front conveyor, which elevates it and delivers it to the intermediate conveyor, which in turn delivers it to the rear conveyor, which deposits the coal in the mine car.

"The rear conveyor can be raised and lowered and swung horizontally in either direction. The front conveyor can be handled the same way for 11 feet on each side of the track center. The operator can operate the entire machine but there are switches on the rear conveyor which enable the trimmer to stop all three conveyors.

RILEY MINE CAR LOADER

"The Riley Mine Car Loader was first installed at the Buffalo Eagle Colliery at Braeholm, W. Va., in July, 1922. Since that time two other experimental machines have been built and operated. The Link-Belt Company is still working on the development of this machine.

Specifications and requirements:

Length, 18 feet.

Height, to suit mine car.

Power, electric.

Power plant, 20 H.P. D. C. motor.

Feed, ⅝-inch jacks.

Loading bar, 7 feet long, revolves 240 R. P. M.

Conveyor, 18-inch drag flight elevating conveyor.

"The Riley or American Loader operates on a bony face on the principle of a shortwall mining machine. The machine is moved along the face by means of a wire rope and a drum on the loader. This feeds the loader into the coal which has been previously undercut and shot. A bar mounted with chisel-pointed bits rotating at 240 R. P. M. undermines the coal which falls on to the conveyor, is transferred, elevated and delivered to mine cars, located under the overhanging end of the conveyor on tracks parallel to the face.

"Use of this machine requires a roof that will stand unsupported for a distance of at least 22 feet from the solid face.

STOCKLY LOADER

"This is the Stockly Loader, a brand new machine and not in use to a great extent. The conveyor operates on a sprocket. The horsepower is only 10. This is called the Ford of coal loading machines. We haven't seen it in operation but it has possibilities. The length is 8 feet in the main section and the rear conveyor 16 feet long. Total tonnage about 2½ tons.

GOODMAN TYPE A

"This is a Goodman scraper and is the product of the development of mechanical mining in the anthracite region. Under the name of the Evans Scraper this type has achieved considerable success in anthracite mining, and its use is equally applicable though not so extensive in bituminous coal mining.

"The Type-A scraper is now built by the Goodman Manufacturing Company is a scoop of 1,500 pounds capacity driven by a double-driven hoist, centrally located with respect to the rooms which it serves and loading out of each in turn. The loading frame is permanently fixed in place from the start of each room until the room is finished.

"Best results in thin coal with this type of scraper are had when bottom instead of top is removed to provide headroom on the entry.

GOODMAN TYPE B

"The Goodman Type-B Scraper, now known as the Entry Loader, is a self-contained, self-propelling unit that loads coal from the face into cars on the entry. Its use eliminates room tracks and in low coal removes the expense of roof brushing in rooms. The scoop has a capacity of 1,500 tons and travels to and from the face at a speed of 450 feet per minute. When loading in a room is finished the scoop is loaded onto the conveying frame unit and travels on the mine track to the next room. Two or three men comprise the loading crew.

ACE COAL LOADING MACHINE

"The Ace Coal Loading Machine was developed by the Pike County Coal Corporation of Petersburg, Ind., and is being operated in the mines of that company. The first machine was installed and started operation on December 27, 1923.

Specifications and requirements:

Scraper, length 10 feet.

Width, 5 feet.

Height, 31 inches.

Conveying frame length, 38 feet.

Width, 7 feet.

Height, varies to suit mine car.

Weight, 12 tons (approximately).

Conveyor Apron, 42 inches side.

Power, 10 H. P., A. C. or D. C.

Hoist power, 100 H. P. double drawn Nordberg A. C. or D. C.

Rope speed, 325 feet minute.

Head Rope, ⅞ inch.

Tail rope, ¾ inch.

Crew, 4 men.

"The Ace Coal Loading Machine is a large scraper installation developed by N. H. McClevey in the Pike County Coal Corporation Mines. The scraper operates on a face varying in length from 200 to 325 feet. The hoist is located at a convenient point near the conveying frame into which the scraper is drawn after gathering its load. The operation of the apron conveyor in its frame is continuous, loading in a trip of mine cars, fed past its discharge point by a small electric hoist. In operation on a 200 ft. face the scraper makes the round trip in about 75 seconds and gathers an average load of 3½ tons. About 13 seconds are required by the conveyor to load a 2½ ton mine car.

MACEACHEN LOADER

"The MacEachen loader has been developed during the past year in the Lowsville, W. Va., mine of the New England Fuel & Transportation Company.

"It consists of two gathering conveyors parallel to each other and mounted on a jib frame on the forward end of an 8-ton Goodman motor. The front end of the motor frame is partially cut away to permit the jib frame to operate. The conveying units deliver the coal onto a secondary conveyor which is carried on the tops of seven mine cars which are coupled to the motor. An ingenious arrangement of sizing screens in the bottom of the rear flight conveyor permits simultaneous loading of 7 cars at one time.

"At a transfer point some distance from the face the car loading conveyor is removed from the trip by an overhead track which later unloads the conveyor onto an empty trip going to the face.

JEFFREY PIT CAR LOADER

"The Jeffrey Pit Car Loader was developed several years ago, one of the first machines to combine the mechanical loading with hand loading and scraper loading.

"The loader is self-propelled and consists of an elevating dray flight conveyor which conveys the coal from the floor to the mine car. In narrow work the coal is pulled or shoveled by hand onto the front of the conveyor. In wide rooms a portable auxiliary hand loaded conveyor or a small scraper operated by a capstan on the loader are often used. The machine is small, inexpensive and easy to operate.

MOVER CONVEYORS

"Mover conveyors were developed and installed about two years ago in the Norton Mine of the West Virginia Coal & Coke Company, coincidentally with the development of the V-System of Mining.

Height, 19 inches.

Width, 20 inches.

Length, 6 ft. sections.

Weight, 200 pounds per section.

"Sections are easily taken apart so that any piece can be easily handled by one man.

Power, electric.

Power plant, 5 H. P., A. C. or D. C. motors at 100 ft. intervals.

"This is an apron conveyor or rollers which run in a track, mounted on a steel frame. The motor sections can be set in at any point and do not interfere at all with the loading or conveying process. Special sections are provided to elevate the conveyor at the discharge point.

"As employed in the V-system, two of these conveyors are placed along a 100 foot face where the coal is loaded onto them by hand.

"These in turn discharge in pairs onto a cross conveyor of the same size. The cross conveyors discharge onto a lateral conveyor of the same type but with a higher frame and a 36-inch pan. This conveyor loads onto mine cars. The power units on the larger conveyor are of the same size but spaced at 60 foot instead of 100 foot intervals.

FAIRMONT CONVEYOR

"The long face conveyor of the Fairmont Mining Machinery Company was recently developed and installed for the Bertha Consumers Company at their Rachel Mine.

Height, 12 inches.

Width, 20 inches effective, overall 30 inches.

Length, 6 foot sections.

Weight, about 250 pounds per section.

Power, 10 H. P., D. C., per 100 foot length.

Speed, 60 feet minute.

"This is a hand-loaded apron conveyor ruggedly built to stand severe conditions. All moving parts except the conveying surface are covered. Skids are provided under each section to aid in sliding it toward the face. It is equipped with a speed-reducer driver that may be placed at any intermediate point in the conveyor.

JEFFREY SECTIONAL CONVEYOR

"The development of the Jeffrey sectional conveyor represents a general trend of the industry toward replacing mine track for secondary haulage.

Height, 12 inches.

Width, 20 inches.

Length, 6 foot sections.

Weight, 125 pounds per section.

Fower, 7.5 to 10 H. P. per 100 feet.

"This is a drag flight conveyor with a single chain in the center carrying the flights. The chain, similar in design to a cutter chain, is driven by a sprocket on the head section. The sections are easily removed or added as they are light in weight. The conveyor is adapted to use as a secondary conveyor, a hand loaded face conveyor, or a machine loaded entry or longwall conveyor.

JEFFREY 44-A CONVEYOR LOADER

"The Jeffrey 44-A Conveyor Loader is designed for self-loading along a modified longwall face.

"A series of drag flights are mounted on one side of a chain of the entry sliding on a sheet steel base which lies flush with the floor. On reaching the head section at the entry they are elevated slightly and scrape the coal into a cross or transverse conveyor of the 47-A Type. Then they are tipped up to a vertical position and return under a sheet metal guard to the end of the face being loaded. This conveyor is extremely flexible. It is fed forward into the coal by screw jacks or bars hand operated. The flights lying on the metal base are not apt to be damaged by falling coal in the shooting process, but boards may be placed to guard them while the coal is being shot. This unit is easily detached into its sections which are about 9 feet long.

"The Jeffrey also has a portable conveyor, 25 feet in length with a three horsepower motor."

Abner Lunsford, General Manager of the Fordson Coal Company, Stone, Ky., then addressed the convention. His address will be found in full on page 296.

Colonel Edward J. O'Toole, General Superintendent, United States Coal and Coke Company, Gary, W. Va., addressed the convention. His paper is presented in full on page 301.

PRACTICAL EXPERIENCE IN THE USE OF MECHANICAL LOADERS

George B. Harrington, President, Chicago, Wilmington & Franklin Coal Company, was unable to reach Cincinnati on the day assigned for this discussion, and **L. D. Smith** of that company presented for him their experiments with mechanical loaders at the New Orient Mine. Mr. Smith's remarks follow:

"The New Orient Mine, where we are experimenting with loading machines, was started about four years ago. At that time mechanical loading was very much in its infancy, so much so that it was not considered at the time the underground layout of the mine was planned. By the time the shafts had been sunk, however, and we were ready to start developing the underground workings, mechanical loading had proved sufficiently successful, that after a careful study of the machines then on the market, we decided to do all of our preliminary underground development with mechanical loaders if it were at all possible.

"The two types of machines which we decided on at that time were the Myers-Whaley and the Joy. The results obtained from our entry driving were sufficiently successful to justify the experiment. In our entry driving, our main object had been to get development and this was accomplished. About last August the mine had been developed to a point where it was necessary to go on an operating basis. As long as we were in the development stage no wage agreement covering machine loading was necessary, but before using the machines on an operating basis in room work, it was necessary to have an agreement covering these machines with the miners' union. It was only last August that we were able to get this agreement.

"Because of the fact that we had no experience in operating the machines in room work under this new machine agreement, and because of the very rapid development in mechanical loading, both in the new types of machines that were being offered and the new systems of mining which were being tried, we did not feel justified in making the very heavy investment in mechanical loaders which was necessary to produce the tonnage which we wished to obtain at that time. We therefore decided to go to hand loading though keeping the ma-

chines which we then had in operation in the mine.

"About the first of this year we were able to turn our attention to experimenting with loading machines in room work. In order to judge the results being obtained from any mechanical device it is necessary to have a clear picture of all of the conditions under which machines must operate. Tonnage figures by themselves are not of great value unless you know the number of men required to produce the tonnage and the kind of coal being produced.

"Briefly then, the Orient Mine is located in the heart of Franklin County, Ill., the coal varying in thickness from 9 to 12 feet. The mine is equipped with a large mine car holding from 6 to 6½ tons when loaded by hand, though it is not possible to get as much as that when loading the car with machines. The mine is laid out on the panel system with 32 rooms to the panel. We decided to make the panel the unit of machine loading. We put two loading machines in the panel with the necessary crew to operate behind it. This crew consisted of two drillers, one cutting machine crew, two haulage motors, one timberman, one trackman, besides the loading machine runner and helper, the entire panel crew being in charge of a panel boss.

"One section of the mine has been set aside for mechanical loading and the machines which were driving entries in the hand section have gradually been transferred to the panels in the machine section of the mine. At the present time, we are operating 14 machines on room work, and six machines driving entries in this machine section of the mine.

"In going to room work, we realized there were several additional problems to be overcome, which we had not had to consider in development work. In loading the "bug dust" from the cutting machines was one of these problems. Under a local agreement, this bug dust must be loaded out of the room before the coal is shot down. It was obviously impractical to take a machine into a room just to load out this bug dust and we therefore had to employ men to load it by hand.

"Another problem was the necessity for loading large coal. We found that the tonnage which the machine would load depended to a great extent on the way the coal was shot. In attempting to get large coal, it is difficult to always judge the shot so that part of the coal will not hang up. This is particularly true in the Franklin County Field where the coal is of a tough, tenacious character, without any vertical clevage planes or faces. We finally adopted the plan of shooting two snubbing shots placed just above the blue band, which occurs about 18 inches from the bottom. The snubbing coal is then pulled out from under the cut, the blue band, which is the principal impurity in this seam, is removed and the balance of the holes are then drilled and the place is shut down. Under the law in Franklin County, no shooting can be done while the men are in the mine. This, therefore, means that the snubbing shots must be shot on one day and the balance of room shots on the day following. However, by this method, we are getting a very satisfactory grade of coal.

"Another problem was the haulage. When we originally started driving entry we only used one motor to take care of three load machines. This was found to be impracticable in room work and we went to the other extreme and used one motor behind each machine. We found that this made a very high haulage cost and we are now trying one motor behind two machines but keeping the machines on the same side of the panel. The opposite of the panel is being cut and drilled, etc., so that it will be ready for two machines on the next day's operation. This method is apparently working out satisfactorily.

"We have not been seriously bothered as yet with the time lost in changing cars. On account of the large car the number of changes is relatively small and the time which is taken up by changing the car can be utilized in oiling the machine, setting timbers, taking down coal which has hung up, etc.

"In summing up we are still in the experimental stage; we believe that some form of mechanical loading is sure to be developed, the results being obtained are steadily improving, the machines themselves are being improved, conditions of mining are being changed to meet the requirements of mechanical loading; and while an evolutionary process of such magnitude is necessarily slow we feel sure that the various problems which are confronting mechanical loading will be solved successfully, but in just what form we do not believe any one can yet definitely predict."

The discussion following this paper brought out the fact that while the company did not feel justified in giving out any averages on tonnages obtained from loaders, they occasionally loaded as high as 185 tons in eight hours, and that the crew necessary to operate the Joy machine and the Meyers-Whaley machine, is about 16 men. Mr. Smith said in answer to an inquiry, that the wage scale is $10.07 per day for runner and helper, cutting machine men are paid on the ton basis, and that other labor varies. The men employed for hand loading receive $8.04; motormen $8.35 and ordinary day labor the union scale of $7.50. Mr. Smith also stated that while their mine was no more gaseous than others in the district, they had had explosions in the past. Mr. Affelder brought out the point that loading machines have been considerably delayed in the State of Pennsylvania, because of the state mining law prohibiting non-enclosed motors in gaseous mines. Mr. Smith stated that Illinois mining law does not make the same requirement, and that practically no explosions have occurred from this source.

I. N. Bayless, General superintendent, Union Colliery Company, Dowell, Ill., in describing their experience with loading machines, stated that their mining conditions are very similar to that of the Chicago, Wilmington and Franklin Company. They are mining No. 6 seam, working the panel system, driving 10 rooms on each panel, or 20 rooms to the pair of panels. Mr. Bayless' remarks follow:

"We started in with loading machines about a year ago, and at the present time have three loading machines, all Myers-Whaley machines, working in entries, and Goodman power shovels working in rooms.

"Last fall we tried out two of these. They were something new; none of our men had been directly connected with mechanical loading in coal mines. Next we installed power shoveling machines for room work. These were driven with track down the center. We soon found out that it was taking too much time to load the cars because the track was in the center. We then changed the track to the left-hand side, and put on an engineer to make a time study of the machines. I believe that the greatest feature on deciding what is to be done in mechanical loading is to get your figures together that tell you the length of time it takes to do a certain operation. We later extended the tracks on the left-hand side all the way up the rooms.

"I don't think we will find any machine for some time that will be known as a universal machine. We are driving a wider room than ordinarily drawn by hand. We haven't got any ill effects from that yet, but we may get some.

"We are trying honestly to work out our own problem, but we are far from arriving at a solution that we are willing to endorse as having solved our mechanical problem.

"We are getting very satisfactory results from the loading machines, but it isn't to be supposed from that, that we are entirely sold on our present type of loading machines. We are sold on mechanical loaders and we think it is only a question of time until we are going to have to go wholly to mechanical loading. We are at the same time educating our organization and trying to find out what the other fellow is doing. We are swapping stories with

them, looking over their machines and trying to find something that would help solve our own problem."

Cadwallader Evans, Jr., General Manager, Hudson Coal Company, Scranton, Pa., was unable to be present personally as announced on the program, but was represented by **H. D. Kynos**, Assistant General Manager of the Hudson Coal Co., who stated that two distinct problems face them in mechanical loading, and pointed out that:

"Our experience in the northern anthracite coal fields of Pennsylvania has brought us down to practically a robbing proposition. The only virgin coal we have on our properties runs from 30 inches to 20 inches in thickness. Therefore, we have from a mechanical loading standpoint two distinct questions. The first question being that of mining thin coal, the second question being that of cleaning up old gang fallen areas in thin veins for further robbing and re-robbing work.

"I will speak first on our experiences in the thin coal. In 1914 the Hudson Coal Company made a study of their property and we found that we had approximately fifteen billion tons of coal in the ground, running below 30 inches, from 30 to 20. Therefore, our big problem became, what to do with this coal. We were unable to mine this coal by hand methods, so we then turned to possibilities of mechanical mining.

"In the year 1914 the Lehigh Valley at their Seneca Colliery had tried out a scrapper method of mining. I suppose you are all familiar with that. It has been described as Goodman Machine here this morning and the Lehigh Valley had then discontinued their experiments, and we took up experiments from where they started. We found after different experiments that mining thin coal three feet and less in thickness, that we were able by means of the scrapper method to eliminate the taking up of the rock in the chambers and the cost of transportation and that we were able to increase our production per miner.

"As you probably know, in the anthracite coal fields in Pennsylvania, we are restricted by law as to a 'miner.' He must have two years' experience and must have a state certificate before he is allowed to mine coal. Also we are up against a labor proposition of one miner being allowed only one helper where work consists of shoveling coal from the bottom into the mine car. You can see how restricted we were on this proposition, whereas on a mechanical method we have been able to increase greatly the production per miner.

"Mechanical mining including the undercutting of coal by machines and the loading by scraper equipment was first begun by this company in November, 1915, in the Upper 4-foot Bed at the Olyphant Colliery. This resulted from a study which showed 24 percent of our reserve coal was in thin beds, 50 percent of which averaged 24 to 30 inches in thickness and which it was deemed could be mined quicker and more economically by machine methods.

"The first operation was machine undercut and hand loaded, and in May, 1916, scraper loaders were introduced. The scraper loader showed the following advantages:

"The elimination of taking up rock in the chambers and the cost of transportation and disposing of this rock. Elimination of track work in chambers and of placing and gathering empties from the individual chambers. The principal advantage laid in displacing much of the hand labor with a mechanical device.

"Various methods were tried out and many experiments made before the present methods: (1) Mining by undercutter and loading by scrapers on longwall operations; (2) using the jackhammer, shooting off the solid, loading by scraper in the chamber operations, were decided upon.

"In 1915 chambers were undercut by machines and the coal hand loaded until 1916, when scraper loaders were used in the chambers, undercutters being used to mine the coal. Early in 1917 jackhammers were introduced and the coal blown off the solid and loaded by scrapers. This, it was found, eliminated a great part of the work and reduced the force by a machine runner and helper and also eliminated the time spent by the undercutter in moving from one chamber to another, which did not tend to economical performance. The undercutters, however, were used at several of our operations on chamberwork until the year 1919, when the longwall method of mining was introduced, using the undercutter for cutting the face and the scraper equipment for loading.

"When scraper loading was first started almost any kind of a double drum engine was used, which would operate a main and tail rope necessary to convey the scoop back and forth to the face. Later a four drum hoist was tried out using a double road on the gangway which permitted the hoist to move from one chamber to another and also to take care of its car supply. On account of the necessity of driving extra wide gangways, this hoist was later replaced by a self-contained two-drum hoist, electrically driven and assembled on a base plate ¾ by 5 feet by 6 feet 6 inches. This hoist has a rope speed of about 400 feet per minute, both drums being of the same size and speed, so that each can be used interchangeably for the main or tail rope. This hoist is of such size that room is easily made between the gangway and airway where this equipment is placed.

"Up until October, 1918, all of the mechanical mining operations were on a company basis. During this time it was found that there was constant friction between the loading and mining forces, so that our production was somewhat hampered. In October, 1918, we first started an operation on contract and from this time have gradually changed over, until the year 1920 practically all the operations were on a contract basis.

"In 1920 with 46 loaders a total of 309,773 tons were loaded with an average of 6,734 tons per loader. Gradual

gains were made until the year of 1924, when with 108 loaders, we produced 1,055,324 tons or 9,772 tons per loader.

"The percentage of the machine mining production to the total coal produced on the property increased from 1/10 of 1 percent in 1915 to 11.1 percent in 1924."

N. H. McClevey, Pike County Coal Corporation, Petersburg, Ind., has developed a mechanical loader to meet their particular conditions. This loader, which is described by Mr. Johnson, of the Bureau of Mines (in this issue), is known as the "Ace" loader, and this machine was on exhibit. Mr. McClevey's remarks follow:

"After the Federal Fuel Commission in 1920 were kind enough to allow the operators to install mechanical loading, we took our proposition, as we saw it and laid it before our Superintendent of Bituminous Industry, Phil. Penna. He prescribed for us and we followed out his prescription. We must say that it has worked out very successfully. One thing in particular he insisted upon and that was that everything should be carried on day work basis, absolutely abolishing the piece work system. The results we have obtained absolutely show that his judgment has proved to be right.

"After our conference with Mr. Penna we returned to the mines and entered into the first contract with the mine workers' organization covering one of our mines, to be worked mechanically. This contract was signed December 15, 1920, and governed the wages and conditions until such time as the Indiana Bituminous Coal Operators Association signed a permanent wage scale. We then went out and secured what machinery we could that looked as though it would be practical for underground loading and followed out experiments that lasted some two years, with an expense of $250,000 to our company. We then found that the machinery we had installed embodied four distinct defects and that these, so far as we were concerned, had to be overcome. First, the coal we loaded had to be loaded over the side instead of under. Second, complicated maximums had to be abolished and different complicated minimum achieved which frequently made it impossible for underground loading. The third was that large enough quantities must be put in front of a motor so that it would continuously operate in loading coal for eight hours, thus saving moving from one place to another. This called for a machine of a more stationary type. The fourth was that tall room tracks had to be abolished and the coal brought to the machine to be loaded instead of the machine taken to the coal. We felt that too much attention was being given to the road gears which only had a tendency to complicate construction and cause us trouble. We found ourselves up against a hard proposition and for the height and length of faces we wanted to work, we couldn't secure a machine on the market. We therefore were forced to build our own machine.

"The first machine was built of wood at the mines, designed especially for the disposing of coal that would collect. We designed twelve or fifteen different types until we found one that would discharge the coal through the bottom of the bucket belt from the tire trouble line and still would not load the fire clay. The 50 horsepower utilized was not hard enough, so we went to 90 and found that that at times failed and in the construction of our first machine we embodied 100 horsepower motor for pulling bucket backward and forward.

"This machine was put in operation some eighteen months ago and has been operating continuously since. It had some errors in it, so we have changed the design slightly. We have now got three more of an improved type working in the mines, and we are meeting with success.

"I think at this time the attention, especially of the operators in the central competitive field, should be turned to the scale of wages which it seems we have fallen to. One of the gentlemen who had more to do with this scale of wages than anybody else advised our company, at the time the contract was signed in 1920, to pay $12 a day to the operating man, holding him responsible for the machinery under his care. It was expensive machinery he was to handle and some one should be held responsible for it. We pay the helpers $7.50, which is the rate of wages per day in the Indiana field.

"One of the first Joy installations happened to be a neighbor of ours and we worked very closely together. He installed loading machines and reached an agreement governing his mine of $12 for operators and $8.14 for helpers. The scale of $8.14 is our rate for motormen.

"Everything worked harmoniously at both mechanical mines until the time came for the miners to pay their income tax and it was found that Mr. David Ingalls' men had been dividing the money and which left $10.07 to be split on pay day; but on account of the income tax it became necessary for the $12 man to pay the income tax and the other fellows escaped. The men went on strike to compel Mr. Ingalls to pay the money from the office, and as they had been doing it for months Mr. Ingalls thought it wise to split the money in the office instead of on the outside.

"That scale of wages traveled over to the Chicago, Wilmington & Franklin Co.'s mines, as explained by Mr. Smith. If all other operators will look to Indiana, they will see where the operators benefited by putting their problems up before a central office, and all working toward the same, and one, point."

Mr. McClevey explained in detail by a series of charts the general method of mining at his property.

T. F. Whalen, General Superintendent, Pittsburgh and Erie Coal Co., Pittsburgh, Pa., presented the actual experiences of his company, with loading machines, saying:

"The changes brought about by the World War have been so colossal that the world is literally being made over. Everywhere the new is supplanting the old. Tools, machinery and devices of all sorts are being discarded to make room for something more efficient. The methods of yesterday are becoming obsolete and systems supposed to be unimprovable a short time ago are daily giving place to better systems.

"Is the coal industry keeping pace with this era of transition? Many outside of the industry think not, for a writer in a high-class publication said in an article on coal some time ago that to shovel five or six hundred million tons of coal into mine cars by hand is as primitive as tilling the vast acreage of soil with a spade. This is a severe indictment of the industry. Personally, I think that the criticism is just to some extent, for when we look around in our travels and note the mechanical equipment in other lines of industry performing more marvelous feats and requiring more intricate movements than is required in the depositing of coal on a conveyer I feel we are obliged to confess that we have not in the past been keeping pace with the progress of mechanical efforts in other lines of endeavor. To wait for the last word in an automobile before buying means that we will never ride. The same thing applies to the mechanical mining of coal. If we wait for the last word in a loading machine we will be mining coal forever by hand.

"The necessity for mechanical mining is great enough now to receive more consideration than it has in the past, however, and while a great number of coal men are not convinced of its success in any form some great achievements have been made in this direction and will continue to be made.

"Our efforts along this line have helped to develop the Oldroyd Coal Loader, which is a heavy machine, weighing approximately 22 tons, is 43 feet long, 60 inches high, mounted on two four-wheel swivel trucks with a truck base of 12 feet and a wheel base of 24 inches and 30 foot rail carries. It will operate on a 25-foot radius curve, although more speed can be attained on a 35-foot curve.

"I am completely sold on the idea of

a large, powerful and flexible machine at a price in keeping with its capacity and efficiency for this is the era for big business and big business methods must be applied to bring the coal industry back to a profitable state, which course we all know requires large amounts of capital with which to purchase and install the most modern and efficient equipment. It is generally agreed that the most important feature about loading machines is the device to gather and deposit the coal on the conveyor. It must be continuous, positive and powerful. All these features are embraced in the Oldroyd machine which we are using. The places are prepared for the loader by undercutting and shearing in the center with the Oldroyd cutting machine, or cutting on top if desired on account of roof conditions and shearing of the center, or in any other location four and one-half feet either way from the center of the track. The coal thus prepared is shot down by a light rib-shot on either side, the amount of the charge per hole depending upon the quality of the coal desired. The dipper or device for recovering the coal will tear down a comparatively solid wall, after shooting as described. In our experience we have found that rooms 18 feet wide with a rib of 14 feet, or any multiple of seven, is the most desirable from the viewpoint of maximum production. Where the track must be along the rib on account of the gob being of slate, the maximum width of room is fourteen feet. Our efforts have been confined to room and pillar mining entirely, which our experience reveals is both parcticable and profitable.

"The principle of depositing coal on the conveyor, however, can be just as readily adapted to long wall or modified long wall systems.

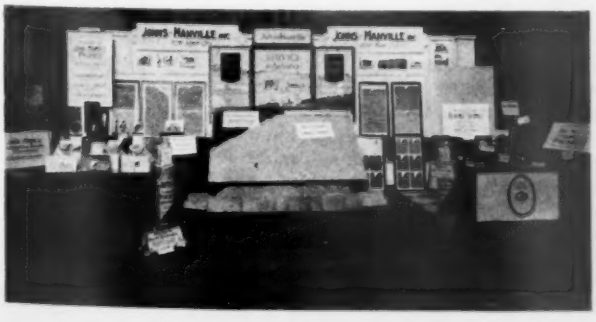
"Our mechanical mining unit consists of one Oldroyd loader, one Oldroyd cutter, two storage-battery locomotives, two electric coal drills. We feel that we have long passed the experimental stage and also that even though our demonstrations have been satisfactory to us we have not had an opportunity to show what the equipment really can do on account of having been hampered by conditions and circumstances not chargeable to the equipment.

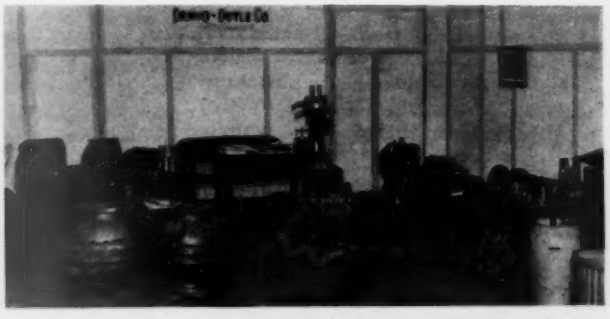
"The best trial we have had was in a mine in northern West Virginia over a three and one-half months period. We used the cars found at the mine, which were of two and one-fourth tons capacity. The mine lay-out, especially on the outside, was such as resulted in more or less delay. Our best day at this mine was one hundred and sixty-eight mine cars aggregating 377 tons. A daily average of 252 tons was maintained for twenty-four eight-hour days the first month after the mine was made ready for the equipment. A daily average of 289 tons for 17 days of the next month and a daily average of 310 tons for the nine days of the first half of the succeeding month. Our demonstrations have proven clearly that with a five-ton mine car in a fairly well equipped mine, this machine will produce five hundred or more tons per day of eight hours and at a cost less than one-half of that of hand loading.

"This equipment is now being put into operation in a mine in Indiana and will require a crew of fifteen men as follows to cut, load, drill and shoot, haul cars to side track near working places and maintain the equipment: Two loader operators, one loader helper, two cutter operators, two motormen, two shooters, two trackmen, one foreman, two extra men, one electrician and machinist.

"The labor cost is estimated on varying tonnages as follows: 300 tons 44 cents, 350 tons 38 cents, 400 tons 33 cents, 450 tons 29.5 cents, 500 tons 26.6 cents, 600 tons 20.2 cents.

"Regarding the matter of development for the room and pillar system, the recovery of coal with a large capacity loading machine is from four to five times as fast as that of hand mining, therefore, roof that will hold for a period of time to permit the driving of rooms, distances of 250 to 300 feet by hand will permit distances of four to five times as great as if the coal is removed in the same length of time. Therefore for one such room, say 1,200 feet long on a 32 foot center in a 7-foot seam, will create available tonnage amounting to 6,000 tons, and in 150 days the rib will be available which will on an 85 percent recovery yield an additional 4,000 tons or approximately 10,000 tons from room and rib after the first room is driven up and the rib attached. One foot of entry will develop 270 tons of coal, therefore one-eighth foot cut per day out of the entry will develop 2,160 tons of coal, which makes the matter of development a simple problem."





MECHANICAL LOADERS IN USE AT THE FORDSON COAL COMPANY

This Company Has Under Way An Extensive Effort To Find A Mechanical Loader That Will Meet Their Requirements—They Are Experimenting With Machines Already Developed, And Plan To Develop A Machine Of Their Own Design

By ABNER LUNSFORD*

THE Fordson Coal Company has planned rather extensive research in the fields of mechanical loading of coal by machinery. Its present aim is to experiment with the best known types of loaders on the market today, to determine which of these are best suited to their conditions. It is also the plan to develop machines of their own design to suit any peculiar local conditions that cannot be met with otherwise.

For this purpose, approximately all of the undeveloped territory of No. 2 Mine at Kentenia, Kentucky, has been set aside for mechanical loading. This area comprises some 267 acres and lies at an elevation of 2,500 feet above sea level. Seam is the Wallins Creek Seam in the Harlan field. Coal is of a hard blocky nature, and has a distinct cleavage plane. Roof is draw slate 8 inches to 12 inches thick, above which is a gray sandy slate which breaks easily. Bottom is soft slate and has a tendency to heave.

The present mechanical loading equipment consists of (1) 5 B U Joy Loader. (1) McKinlay Entry Driver, (2) Jeffrey 47-A Sectional Conveyors, and (1) Jeffrey 38-B Pit Car Loader. As the McKinlay Machine has aroused a good deal of interest among mining men, and is unfamiliar to most operators, a brief description of it is given here.

McKINLAY ENTRY DRIVER

This machine is manufactured by the Marietta Manufacturing Company of Point Pleasant, W. Va., under the patents of Mr. E. S. McKinlay. The one in operation at the Fordson Mines is the same one that was illustrated in the Coal Age Magazine some months ago. It is, as its name implies, an Entry Driver of the Rotary Cutter Type, and mines and loads the coal without any of the usual operations of undercutting, drilling and shooting.

Cutting Elements—Its essential features consist of two heavy cast steel cutter arms mounted on horizontal shafts, which revolve the arms towards each other in overlapping circles. These arms carry cutter plates of which there are six to each arm. Cutter plates are fitted with cutter bits of special design, held in place by wedges, and cut circular kerfs in the coal. Revolving wedge shaped rollers attached to the cutter arms enter the kerfs when a certain depth of cut is reached and break out the coal, which falls in front of machine, behind the cutter arms. The cutter arms leave a triangular segment of coal at the top and bottom of entry directly in the center. These segments are undercut and overcut by a special cutter chain driven by sprockets mounted on the cutter arm drive shafts; the wedging action of chain guides breaks out this coal as the machine moves ahead. Each cutter arm carries a pilot drill which drills into the coal slightly in advance of the cutters and breaks it out towards the first circular kerf.

Loading Elements—Coal broken out by the cutter arm is delivered to a steel flight conveyor mounted in the bottom of the machine frame. Coal is loaded on the conveyor by a revolving scoop attached to each cutter arm, which scoops up the coal and delivers it onto conveyor, with a combination of sweeping and shoveling motion. On the present machine this conveyor extends back for enough to discharge onto the 38-B Pit Car Loader previously mentioned, which elevates it into the mine car. In the later machines now being built, this second conveyor is made to elevate over several cars and is connected to machine and moves up with it.

Advancing Elements—Machine is advanced forward into the coal by hydraulic pressure, a hydraulic cylinder being mounted in center of machine on the level with cutter arm drive shafts. This cylinder contains a piston, the rear end of which is connected to (2) 3-inch extra heavy pipes which are set jacked into hitches cut in the rib on each side of entry. They form a rigid toggle with piston and take the reactive thrust. Feed of machine can be varied by varying speed of motor which drives the hydraulic pump. Stroke of piston is three feet, which enables machine to load about two and a half cars at one setting. When piston is run out to its maximum length, pressure is reversed and it is drawn back, and jack pipes are set in new hitches cut three feet ahead. This takes from three to five minutes. Hydraulic pressure varies with hardness of coal, and the feed; it runs from 800 lbs. to 1,200 lbs. square inch when driving on the butts and from 300 lbs. to 500 lbs. square inch when driving on the face of the seam. This gives an advancing force on machine of from 12 to 19 tons when cutting on the butts and from 5 to 8 tons when cutting on the face. Force required to back up machine is from 5 to 8 tons, depending on the clearance and the nature of the bottom.

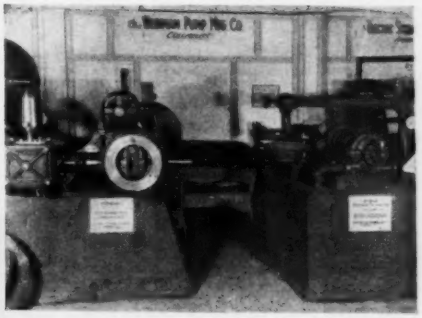
Horizontal alignment of machine is accomplished by setting one jack pipe tighter in the rib than its mate, and thrust of piston slews machine. Vertical alignment of machine is maintained by means of a leveling device operated by screws, attached to each of the four wheels of machine, and this device raises or lowers the wheel centers.

Driving Elements—The main drive on machine consists of a 50-HP motor, 450 RPM, enclosed type, compound wound, manufactured by the Northwestern Manufacturing Company. This motor drives the cutter arms through a set of gearing, the final reduction being a worm and gear which reduces cutter arm speed to about 10 RPM. This motor also drives the conveyor on machine. Hydraulic feed pump is driven by a 2-HP motor. Control of machine is effected through a four-way valve and a needle valve, the former reverses the direction of piston travel, the latter controls the feed. Control of machine is very simple, it being merely necessary to close the needle valve thereby stopping the forward feed of machine, and allowing the motors to run light when any temporary delay occurs.

Shape of Entry—The shape of entry cut by this machine is approximately an oval with a flat portion on the top and the bottom of the seam. Its width is 11 feet and its height 5 feet 10 inches on present work. The length of the flat portion is about 5 feet 6 inches. Machine has adjustable cutter arms and can cut from 5 feet 6 inches to 6 feet 6 inches height of seam, and from 10 feet 8 inches to 11 feet 8 inches width of entry. To the observer looking down an entry cut by this machine, its shape resembles nothing so much as gazing into the muzzle of a double-barrelled shotgun. Its contour is ideal except for the rounded bottoms, as the arched ribs will hold very bad roof, and reduce the danger from this source to a minimum. On any new machines built, bottom of entry can be squared off, thus eliminating this present objectionable feature.

Operating Crew—Machine requires three men for its operation—an operator, a helper on machine, and a helper to trim cars. On improved models with centrifugal control, it will be possible

* General Manager, Fordson Coal Company. Address delivered at the National Exposition of Coal Mine Equipment, Cincinnati, Ohio, May 27.



to operate with two men to a crew. Wages paid are $1.25 per hour for operators, 90 cents for machine helpers, and 80 cents for car trimmers.

Performance Record—Machine when first purchased was provided with a conveyor system that proved unsuitable and as a result, much delay was experienced in rebuilding machine. After some experimental work with various conveyors the machine was placed on a test run under full feed to see what it was capable of doing. On this run it drove 30 feet in 3 hours and 3 minutes of operating, but due to poor voltage and lack of sufficient horsepower on main motor, this record could not be maintained. A new substation was placed under construction, in order to improve voltage conditions. Horsepower on a machine of this type is rather difficult of calculation, and ample reserve should always be provided for in the design, as the service is extremely severe. After making the test run, machine was placed on one-third feed to enable continuous operation, and the heading was driven to the crop in 24½ shifts of 8 hours each. Distance was 368.5 feet or an average of 15 feet per shift. The average operating time during this run was 2 hours and 5 minutes per shift or 27½ percent; delays, 5 hours and 36 minutes or 72½ percent. On this heading, and the next one also, a Jeffrey 47-A Sectional Conveyor was used behind the machine, sections being added to it as the entry advanced. This method did not prove a success, as the delays of each shift due to adding sections amounted to 1 hour and 29 minutes or about 19 percent. The greatest source of delay was car supply, an inherent fault with all entry drivers so far developed, and this could not be remedied as it was due to the design of machine, allowing only one car at a time to be loaded. Machine actually broke right through into the daylight, the last 10 feet of entry being dirt and fireclay that was loaded out by machine. Some water was encountered in this entry, also drawslate from roof gave some little delay, especially near the crop where roof was full of hill seams. The arched ribs in this style of entry, however, very effectually held all loose brows and little danger was experienced from this source. Some trouble was encountered from dust made by machines, but by keeping the ventilation up close to it with flexoid tubing, supplied with air from a booster fan, placed in the last break-through, this caused but little delay.

A very careful field study was made of the machine during this run, including a daily time study, and all points of improvement in design, construction and operation noted from an engineering and mining standpoint. The object in mind was to embody these features discovered as a result of experience into any new machines built, also to improve the present model as far as possible. A complete detailed report was drawn up after these points were carefully discussed with the mine superintendent, engineer, mine foreman, machine operator and the manufacturing company's representative. The manufacturing company was given a copy of this report for their information.

After driving out the heading mentioned, called 10th Left heading in this mine, machine was pulled back from the crop a distance of 150 feet with two 10-ton haulage motors and swung around into the right hand rib. Four cuts were previously made with a cutting machine, and loaded out with Joy Loader, in order to provide room to turn machine. Machine was turned by placing a heavy timber under a cutter arm and turning on the power, turning effort of arm slewed machine around. It required five shifts to clean up entry, move back machine and get it to a point where it could advance under its own power. Cost of this moving was $117.20.

This heading, or room, rather, called No. 5 room on map, was driven a distance of 315 feet in 21 shifts, or an average of 14.7 feet per shift. A good deal of trouble was experienced in this run, with soft bottom as machine kept plunging due to the weight being largely on the two front wheels. Also the machine was at this time equipped with a belt conveyor which gave continual trouble until replaced by the present steel flight conveyor.

When this room was driven as far as desired, machine was again pulled back about 50 feet and swung into the right hand rib. Due to the fact that the flight conveyor had increased the length of the machine, five cuts had to be loaded out with Joy Loader before the entry driver could be turned. Total time to turn machine and reach a point where it could advance under its own power was approximately the same as the previous time. Machine then drove this butt off heading back parallel to the first or 10th Left Heading, a distance of 535 feet in 32 shifts, or an average of 16.7 feet per shift. Power conditions were very unfavorable, and motor had to be carefully watched and frequently stopped to cool it. Main motor armature was taken out and rewound, also new field coils put in, and a larger size feed cable put on machine. Machine broke through into No. 2 room off 10th Left Heading and was exactly on centers. This operation completed the blocking out of a panel of coal 535 feet long by 265 feet wide, containing 37,000 tons which is now ready for extraction by any desired method.

It is now the plan to use machine to drive out what is known as 13th Right Heading, which will bisect the property and furnish about eight months' work for the machine. In order to avoid dismantling in moving to this new location, it is cutting its way to this point and will cross two entries and the main haulage way before reaching its next task. The distance to go is 1,100 feet and at the present date, May 15, 1925, machine has driven 409 feet of this amount. Of the 409 feet driven, 329 feet were driven between May 3, 1925, and May 15, 1925, with two shifts lost for repairs. Power conditions have been improved and advancement was increased by 50 percent on first day under favorable power, as the machine drove 32.5 feet and loaded 28 cars. Unfortunately at this time machine ran into thin coal, which compelled machine to cut about six inches of roof slate, hence feed had to be reduced. Average footage per shift even under these conditions was 16.45 feet. Normal height of seam was reached on May 16, 1925, and from then to May 20, 1925, machine drove 63.99 feet, or an average of 21.33 feet per

shift. The production and cost data are given on page 300. These include test run, and the record up to May 1, 1925. Test run data gives an idea what machine can do under favorable power conditions and with other conditions favorable, machine should run fairly close to this figure, even in its present state of development. A new model, correctly designed to meet conditions at No. 2 mine should easily better this average. Performance record on sheet M2 shows what machine has done up to May 1, 1925, under unfavorable power conditions.

Analysis of Machine—A review of the machine from an engineering and mining standpoint reveals the following advantages inherent in it.

1. Machine is readily capable of being developed into a high class entry driver, and even in its present state of development can be considered a paying proposition.

2. It cuts an ideal shaped entry except on the bottom, which can be readily squared off as noted on any new models built. Brows along the side which are ordinarily a menace are effectually held by the arched ribs in this style of entry. Where seam is of sufficient height to permit the leaving of at least 6 inches of coal for roof, extremely bad top could be held, this effecting a big saving in timbering and slate work.

3. Machine can drive right to the dirt, since it requires no shooting, hence there is no shattering of the roof.

4. Machine is simple in construction, has few moving parts, is comparatively easy to operate, and should, perfected and standardized, be comparatively reasonable in first cost and upkeep.

5. A new model incorporating the recommended improvements which experience shows are necessary, should easily average 30 to 40 feet per eight-hour shift in this coal, and a proportionately greater amount in softer coals.

6. The greatest feature of merit of machine lies in the rapidity with which it can drive entries, thus enabling the property to be opened up in one-half to one-third the usual time, thereby rendering possible quicker returns on investment capital, and enabling development of the mine to its maximum output in a much shorter space of time.

Disadvantages of Machine—The machine has at present the following disadvantages:

1. Machine is not readily portable or easily moved, therefore it is best adapted for comparatively long headings where moving would be reduced to a minimum. Experience at Banner Fork has demonstrated this fact conclusively. Driving short rooms and cutting break-throughs with machine is not to be recommended.

2. Machine is not adapted to coals where sulphur balls or streaks, sand boulders or similar hard substances are frequently encountered. Slate partings are no hindrance, except as they effect the impurity of the product. Machine will cut any substance that can be cut with any style or type of cutting machine and even somewhat harder substances.

3. Machine cannot be easily turned in an entry, hence at present it is not adapted to cutting entries with sharp curves. This feature can be accomplished, however, in new machines by proper design of cutting elements.

4. Machine cuts a fixed width of entry within the rather narrow limits previously mentioned, therefore slabbing must be resorted to, to gain sufficient room for side tracks, and any other special clearance desired.

5. Machine is of necessity extremely heavy and therefore gives trouble in mines that have a soft bottom. This feature can be remedied by proper distribution of the weight and by providing a greater supporting area.

6. Machine makes considerable dust in hard coals like the Wallins Seam, and therefore in gaseous mines where feeders or pockets are encountered, extreme care would have to be taken to prevent an explosion. The manufacturing company is giving the dust problem careful study and in the new machines, provision can be readily made to settle and collect the major portion of the dust. Special care would have to be taken, even in this case, if mine were gaseous.

Conclusion—The conclusion that has been reached based on experience with this style of machine is: That as an entry driver, it will, when properly developed to meet the severe service demanded of it be a paying proposition in mines that have considerable development work left, or in opening up new mines. Care should always be taken to ascertain carefully the local conditions to be met in the mine, and to see that the manufacturing company is fully and completely informed as to what will be expected of machine.

Joy Loader

The 5-BU Joy Loader is more or less familiar to most mining men, and no description of it will be attempted here. This machine has been used on narrow work for the most part since its purchase, driving up rooms and headings, hence its tonnage has not been anywhere near what the machine is capable of doing, since a great deal of time has been lost in moving.

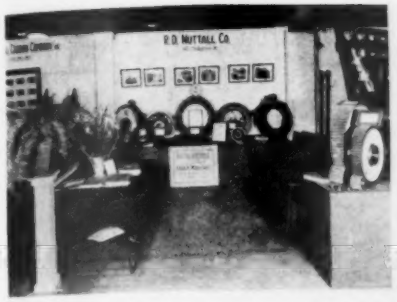
Machine has been tried out on longwall work and has loaded as high as 55 cars in 2½ hours time, or an average of 3 minutes per car. This is equivalent to 66 tons per hour, or 1.1 tons per minute on steady run. Due, however, to mechanical trouble on loader and also to roof conditions, machine could not keep up this record. Experiments so far have seemed to indicate that machine requires too much roof span to enable it to be used as a pillar drawing machine in this seam where roof breaks clear to the face and hill seams are frequently encountered.

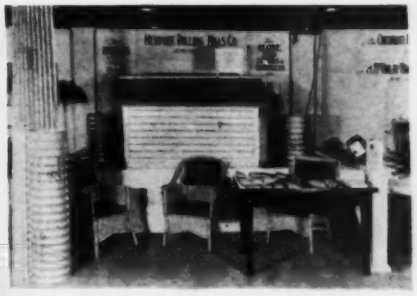
At present the method being tried out is to drive rooms up 12 feet wide on 44 foot centers, and widen them by slabbing cuts on both ribs to 40 feet, leaving a 4-foot wing to be extracted by pocket and stump method. Machine is now being used to drive up the rooms preparatory to slabbing, and, of course, this work requires a good deal of moving. Tonnage records will be a great deal better when slabbing cuts are made.

Development Record—As a developer of property, this machine excels, since by reason of its ready portability on the mine track, or on its own caterpillars, it can quickly move from place to place, and thus keep a number of rooms advancing. From January 13 to May 15, machine has made the following development record: It has driven 445 feet of rooms, 12 feet wide, 1,115.9 feet of rooms 20 feet wide, and 847.9 feet of 15-foot heading and break-throughs. This footage reduced to equivalent 20-foot rooms gives a total of 2,017.9 feet of room, or an average of 13.68 feet per shift. Reduced to equivalent 15-foot heading, this gives a total of 2,693.9 feet of heading, or an average of 18.24 feet per shift. Total number of places worked has been 21.

Performance and Cost Record—Performance records on this machine show that up to the first of May it has loaded 15,093 tons of coal in 103.5 days, or an average of 146 tons per day, at an average total cost of 43.65 cents per ton. Average operating time was 25 percent, delays were 75 percent. Hand loading costs for this same tonnage would have totaled 62 cents per ton. Thus machine has effected a saving of 29.6 percent in cost, plus the development work which is at least twice as much as could have been driven by hand. The high cost of machine coal has been due mainly to the low tonnage on account of the narrow work. Also the operating cost has been 18.8 cents per ton alone, due to the high wage scale paid, which is double that paid in some fields. Other costs have been as follows: Timbering, 1.65 cents per ton; track, 3.27 cents per ton; shooting, 1.97 cents per ton; haulage, 6.47 cents per ton; oil, 2.15 cents per ton; explosives, 3.28 cents per ton, and repairs, 4.56 cents per ton.

Repair cost on this machine has been high, due partly to mechanical trouble on machine and partly to lack of trained operators. Machine has encountered rather severe service in this hard coal





and some parts have proven too light, also certain portions of machine have until recently been made of cast iron, which caused a good deal of breakage. Manufacturing company has since substituted steel for most of these parts and a good deal of the trouble from this source has been eliminated. Machine has until recently suffered from the lack of trained operators, as it was necessary to break in green men often at the expense of the machine. Also the control of machine was changed from hand to hydraulic after its purchase and this added to repair cost. New machines purchased will, of course, profit and benefit by the experience gained with the first one, and should not experience as much difficulty either from repairs or from an operation standpoint.

Analysis of Joy Loader—A summary of this machine from an engineering and mining standpoint reveals the following inherent advantages:

1. Machine has probably no superior as a loading device since its gathering mechanism is continuous in action and operates with nearly 100 percent efficiency. It has loaded 3 tons of coal in 57 seconds in this seam, handles lump or slack with equal ease, can dig down coal that is hanging after a shot. This last feature is important, and is one of the strongest points of advantage in this loader, since the coal does not have to be heavily shot for it, as must be done with certain other types of machines. Machine does not have to be kept at the edge of coal pile, as it may have its gathering arms flooded or buried and will soon dig and load its way out.

2. Machine is readily portable and can be easily and quickly moved from place to place either on the mine track or on its own caterpillars. This feature is of extreme value since it enables one machine to work in a number of places and thus a maximum amount of development per machine can be obtained.

3. Machine is very flexible and can load at almost any position of car with respect to machine, and will clean up a place very thoroughly if handled by a skillful operator.

Disadvantages of Joy Loader—Machine has the following disadvantages:

1. It is of necessity complicated in construction, has a great number of moving parts, hence has a great many places to get out of order, and is rather hard to repair on certain places.

2. Machine is far from being in the fool-proof class, and requires a very high grade of skilled labor for its operation. Operators must be carefully selected and trained, since it requires a combination of skill, intelligence and natural initiative and energy to successfully operate this machine.

Conclusion—The Joy Loader without a doubt can be made a paying proposition in this seam, as even in its present work on narrow places, high labor costs, high repair cost, etc., the total cost of the coal produced by this machine has been 29.5 percent less than the cost by hand, and the difference will be greater when machine is placed in a position to work to best advantage, i. e., when slabbing work is begun on the room ribs. New machines purchased will, as stated before, benefit by the experience gained with the present one.

47-A Sectional Conveyors—This machine has proved to be a reliable conveying apparatus, and has given very good service. It is easily assembled and dismantled, the single chain feature is of great value in this operation, since it cuts the time required in half. The gearing on present machine is rather light for full load conditions as wear is excessive, also motor frame should be more securely braced, and motor provided with means to exclude dust. Machine requires a good deal of head room over cars and works to best advantage loading on the entry where top can be shot down to clear lumps of coal. This machine was used for a time on a long face of 180 feet long, taking the coal away from the Joy Loader. During a temporary breakdown of Joy Loader, conveyor was used to keep face advancing coal being shoveled into it by hand. Average tonnage loaded per man was 25 tons per 8-hour shift at an average cost of .2959 cents per ton, a saving of .3241 cents per ton over the cost of loading by hand, or 52.3 percent. No attempt was made at this time to use machine for this service, as it was a temporary arrangement, during the repair work on the Joy Loader.

The 38-B Pitt Car Loader has been used behind the McKinlay Entry Driver and has proven itself to be a reliable conveying apparatus.

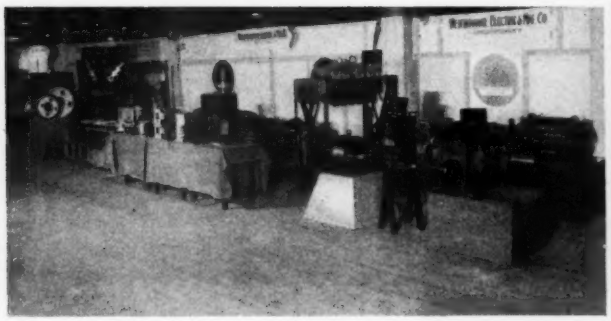
General Conclusion

The mechanical loading of coal by machines resolves itself into two main problems, namely, the machine problem and the mining problem.

Machine Problem—The machine problem consists of two main features—design and construction, and operation. Design and construction is purely an engineering question. Its solution consists in carefully selecting the proper type of machine to suit the mining conditions, if necessary develop one, then by careful design and construction produce a machine that will load the coal at the least cost. The closest possible cooperation should always be maintained between the engineering and mining departments. The designer should thoroughly familiarize himself with field conditions, and should frequently consult with the mining staff, and their ideas and opinions should be given careful consideration. Too much emphasis cannot be laid on this cooperation idea, as it is surprising how little of it is actually done in practice, and how few mining machine designers have ever had any actual experience at the face. It is safe to say that at least 75 percent of all machine trouble encountered in the field, could be eliminated or greatly reduced, if the designer was allowed to become familiar with mining conditions.

Only the very best materials of construction should be used, as mining machinery encounters perhaps more severe service than any other kind. Simplicity should be the keynote of construction, and accessibility for repairs. Motive power should have at least 100 percent reserve capacity, and motor should always be continuous rated, and protected from dust and moisture. In general, the design should be as nearly foolproof as it is possible to make it, and extreme care should be given to details, as these little features are what cause the trouble, delay and expense at the face.

Operating Personnel—Only the very



best of labor available should be selected for loading machine operation. The operator is the real leader of the crew, and upon his energy, initiative and determination to get the best from the machine depends to a great extent the daily tonnage, other conditions being equal. Too great care cannot be used in the selection of crews for the machines.

Mining Problem—The solution of the mining problem consists in selecting the best system of mining for the machine. This must be found out by trial and experience, and all factors taken into account. The main essentials to be considered are ventilation, transportation and roof control. The first of these, ventilation, is generally the easiest to handle, except in gaseous mines. Transportation requires careful study to reduce the delays in shifting cars and moving loads, the ideal to be aimed at always is the loading of as many cars as possible in a string and the rapid shifting of loads and the bringing in of empties.

The roof problem is the most serious of all, since it involves forces of extreme magnitude, and uncertain conditions. Here again the solution calls for the close cooperation of engineering and mining experience, since the problem is at least 50 percent of each. A careful study of this question reveals the following fundamental principles to be borne in mind, in the working of long faces by machines: First, use machines that require the minimum distance from the solid face, i. e., keep the roof span as short as possible; second, use some positive means for breaking the roof that is powerful enough to break roof behind machines, yet readily portable and quickly adjustable to various heights of roof. Experiments in West Virginia seem to indicate that the use of hydraulic jacks for roof control will eventually be the solution to the problem, since they fulfill all of the three requirements above named, strength, portability and adjustability. Their first cost is higher than the use of timber, but the saving in the price of heavy "Jack Timber" soon compensates for this.

In general, the mechanical loading of coal by machines is an engineering and mining problem and its successful solution depends on the closest possible cooperation between the two departments in any organization.

McKinlay Entry Driver*

Test Run, December 6, 1924

Machine on fast feed.
Cars loaded 24
Tons loaded 62.4
Distance driven.....30 feet
Operating time ....3 hrs. 3¾ mins.
Delays time .....3 hrs. 53¾ mins.
Av. time to load car.....7.62 mins.
Av. delay per car.....9.74 mins.

Machine Loading Cost

Labor	$ .378	per ton
Power	.025	per ton
Oil	.015	per ton
Depreciation	.100	per ton
Total	$ .518	per ton
Total	1.08	per foot

Hand Loading Cost

Labor	$ .62	per ton
Cutting	.12	per ton
Power	.015	per ton
Yardage	.240	per ton
Oil	.010	per ton
Total	$1.005	per ton
Total	2.09	per foot

Saving $ .487 per ton, or $1.01 per foot—51.5 percent.

Entry driven at least three times as fast. Property developed in one-third usual time. Returns on investment in one-third usual time.

Note—Above record also indicates average performance of machine under favorable conditions.

McKinlay Entry Driver

Performance Record, November 16, 1924, to April 30, 1925.

Tons loaded.....3,211
Distance driven .....1510 ft.
Total shifts worked.....94½
Average tonnage per shift.....34
Av. distance driven per shift..16 ft.
Av. operating time per shift...30%
Av. delay time per shift.....70%
Av. time to load car.....11.1 mins.
Av. total delay time per car .....25.9 mins.
Av. time to switch car .. 9.24 mins.

Machine Loading Cost

Labor	$0.695	per ton
Repairs	0.173	per ton
Power	0.025	per ton
Oil	0.015	per ton
Total	$0.908	per ton
Total	1.93	per foot

Hand Loading Cost

Labor	$0.62	per ton
Cutting	0.10	per ton
Power	0.015	per ton
Yardage	0.236	per ton
Oil	0.010	per ton
Total	$0.981	per ton
Total	2.085	per foot

Saving .... $0.073 per ton —7.4%
Saving .... 0.155 per foot—7.4%

Entry driven twice as fast by hand. Property developed twice as fast. Returns on investment in one-half the usual time.

Note—Machine was on one-third feed during this run on account of poor power conditions.

Jeffrey 47-A Sectional Conveyors

Tons loaded.....690
Shifts worked..... 6.875
Av. tonnage per shift.....100.1
Av. tonnage per man per shift. 25

Loading Cost Using Conveyor

Labor	$0.264	per ton
Power	0.015	per ton
Oil	0.005	per ton
Repairs	0.0119	per ton
Total	$0.2959	per ton

Hand Loading Cost

Labor .....$0.62 per ton

Saving ....$0.3241 per ton—52.5%

* Data prepared by Messrs. L. C. Skeen, Superintendent, and J. M. Schwartz, Engineer.

MECHANICAL LOADING AT THE UNITED STATES COAL AND COKE COMPANY*

The First Cutting And Loading Machine Was The "O'Toole" Designed About 1898 —Latest Model Of This Machine Is Now In Use By This Company—Results Obtained Through Its Use Outlined

By EDWARD O'TOOLE†

THE forerunner of the present loading machine was first put into use in England about the year 1888 and was brought to this country by the Sullivan Machinery Company. They redesigned it and experimented with it for several years. They added the conveyor to carry the coal back to the mine cars and succeeded (in a mine in Southern Illinois) in cutting and loading out 35 feet of entry in an 8-hour shift.

However, the mining men at that time were not interested in the rapid driving of entries, and nothing further was done towards developing this machine.

The first real cutting and loading machine was the O'Toole cutting and loading machine, designed and built about the years 1896-1898, and installed in Leisenring No. 3 Mine of the H. C. Frick Coke Company, at Monarch, Fayette County, Pa.; and later in the Leckrone Mine of the same company at Leckrone, Pa.

A later type of the same machine was built and installed in the No. 9 Mine of the United States Coal & Coke Company at Gary, McDowell County, W. Va. This machine cut a heading 10 feet wide and any desired height from 6 to 8 feet.

With this machine we succeeded in loading 115 tons of coal in one 9-hour shift, which advanced the heading 42 feet. The difficulties were inability to keep up the mine road for the mine cars; to keep the machine supplied with mine cars and provide ventilation for the men operating the machine. When working, this machine cut and loaded 1 ton of coal per minute, but was generally idle five-sixths of the time, waiting on cars, ventilation, etc.

To overcome these difficulties an air method of transportation of the coal through large pipes was installed. This was found unsatisfactory on account of the excessive power cost and breaking up of the coal.

All the machines I have mentioned demonstrated the practicability of a cutting and loading machine for heading driving purposes, and plans and mine projections were made that would permit 90 percent of all the coal in the seam to be mined by this type of machine. However, these plans were never put into general operation, because it was found that there was no necessity for so much advanced heading; as about this time (1914) a new mining system, known as "The Rib Drawing Advancing Method," was put into successful practice and gave much better results than possibly could have been obtained from the heading type of cutting and loading machines.

This new mining method and the excessive low labor rates prevailing at that time, and the resultant low labor cost of mining coal, caused a cessation of our efforts to produce a successful coal loading machine.

The World War brought on a great scarcity of coal mine labor. Immigration from foreign countries practically ceased, and labor costs of coal production became excessively high; which in turn directed the minds of inventors again to coal loading machines—and almost every original mind in the coal business attacked the problem of producing a successful machine, with the result that many types of machines have been put on the market.

Some of these machines load the coal as the miner loads it when using a shovel (a small quantity at a time). Some scrape it into the mine cars with scrapers or scoops, just as sand or loam is moved. Some use a machine which undercuts in the regular way, then knocks down the coal with an attached pneumatic punching machine of high power, the coal falling on to a conveyor which loads it into the mine cars.

Some machines make a series of horizontal cuts in the seam, then break out the intervening layer of coal by pressure; have the coal fall on to a conveyor which loads it into the mine cars, while some have used a modified form of the steam shovel.

All machines designed for coal loading only require the coal to be broken loose from the seam before they can operate, which necessitates the use of another machine, and bringing the coal down by blasting.

Our efforts have been directed to the construction of a single self-contained machine that can be operated in such a way as to perform these three necessary operations simultaneously; that is, to undercut the coal, break it down with the weight of the overlying strata, and load it into the mine cars.

The strata overlying coal seams will weigh about 150 pounds per cubic foot. Therefore, the pressure on the coal will be per square foot 150 pounds multiplied by the thickness of the overlying strata, plus the weight of the strata overhanging the excavated portion of the seam. At times the concentrated pressure on the face of the coal being worked will be multiplied by three or four or more times the weight of the overlying strata; so there is no doubt but that at all times there can be maintained sufficient weight to bring down the coal when undercut, no matter how hard the coal may be. The science of the operation will be in bringing the weight to bear at the proper

*Address delivered at the National Exposition of Coal Mine Equipment, Cincinnati, Ohio, May 27th.

†General Superintendent, United States Coal & Coke Co., Gary, W. Va.

time and at the proper place, so the coal brought down will be of the proper size.

One of the greatest difficulties with loading machines is that when the coal is undercut by the regular undercutting machine to a depth of 5 or 6 feet and blasted down, it is generally in pieces too large to be handled by the loading machines, and men must be provided to break the coal into the size the machine can handle, or when blasting it down, blast it strong enough to insure its being broken fine enough to handle by the machine.

This difficulty is also experienced with our cutting and loading machine, but not to the same extent, for the reason that the roof pressure, when properly controlled, will bring down the coal when the undercutting has proceeded to about 1 foot in depth. So the pieces of coal are generally not over 1 foot thick, and where larger are in flat slabs which are easily broken, no blasting, or very little blasting, being required. Consequently, there is a minimum of pulverized coal, small particles of coal coming principally from the cuttings.

All loading machines have been more or less successful. The originators and developers have worked hard and spent a great amount of money. As to whether we have produced a machine which is or will be a commercial success, you will have to be the judge. As a word of caution to you before passing judgment, I will say that the mining industry has been too conservative in its attitude toward machinery. It has not requested machinery for definite purposes, depending upon the machinery manufacturer for the improvements in machinery. In fact, some of the leading coal companies were using breast machines for undercutting their coal until last year, and some of these breast type machines may still be in use at some mines. These machines were out of date 20 years ago and should have been abandoned at that time.

When open-cut ore mining came into vogue in the iron regions of Minnesota and Wisconsin, some 25 or 30 years ago, they used practically the same type of equipment for hauling and loading the ore into railroad cars as was used for hauling and loading coal and mine refuse about the coal mines of Pennsylvania—small cars, small locomotives—and a large portion of the ore was loaded into these small cars by hand or by small steam-operated machines.

But the type of machinery used has changed so far as the ore mines are concerned. While the coal miner stood still, the ore miner went ahead, applied steam, mechanical power and electrical power to his work and enlarged and improved his machinery, until at the present time they have shovels which reach 150 feet on each side and move 15 tons of iron ore with each dipper full, and load a 50-ton railroad car every 5 or 10 minutes of the day.

The difference in cost between mechanical applied power and hand power in the coal mine is enormous. As an example:

"Seven men working 1 hour will develop 1 horsepower hour. As mine labor today is worth and is costing about $1 per man per hour, each horsepower hour developed by hand labor costs in dollars and cents $7. You can purchase electricity for 2 cents per K. W. H. at the bus bars of your substation, and a K. W. H. exceeds a horsepower hour by 25 percent."

Thus it is evident that power developed by hand labor is over 400 times more expensive than mechanical power. The problem of the mining machine builder is to apply mechanical power to the various divisions of mining. To some of the divisions, such as undercutting and hauling, mechanical power can be readily applied, but to other divisions, such as putting down and taking up mine roads, setting and drawing timber, loading coal into mine cars, etc., will be more difficult, but it can be done, and it must be done. I believe we are now where we will see great changes in both the methods and the machinery used for mining coal.

The problems we are applying ourselves to at the present time are cutting and loading coal by one operation, roof control, the elimination of drilling and blasting, simplifying the hauling, and ventilation and drainage of the mines.

The following is a record of our progress to date, and a statement of what we believe we can do.

First, I wish to explain that I am now speaking of the O'Toole cutting and loading machine. Only one of these machines has been constructed so far, and this original machine is at work 18 hours per day in No. 6 Mine of the United States Coal & Coke Company at Gary, McDowell County, W. Va., where it was installed December 1, 1923, and where it has been working ever since, having cut and loaded up to date (May 26, 1925), a period of 18 months, less six days, 17.06 acres of coal.

The outstanding performances are as follows: With a crew of eight men, the machine has loaded:

63	tons in 1 hour, or 7.875 tons per man hour.
318½	tons in 8 consecutive hours, or 4.976 tons per man hour.
518	tons in 16 consecutive hours, or 4.047 tons per man hour.
672	tons in 24 consecutive hours, or 3.500 tons per man hour.
1,274	tons in 48 consecutive hours, or 3.318 tons per man hour.

You will note that the best production for the 1-hour period is better than the hourly rate for best production for longer periods. This is due to the fact that many 1-hour periods can be selected when loading was continuous and uninterrupted; but when longer periods are considered there are included in such periods intervals when loading was interrupted by time consumed in making adjustments and repairs to the machine and track, moving up roof supports, waiting on mine cars, etc.

But the important development is that by our present method, using all the best undercutting machines, most advanced methods of mining, etc., our miners (which means cutters, scrapers, drillers, blasters, loaders, pick miners and timberers in working places) can only produce 1.91 tons per man hour, or about 15 tons per day per man; while by and with the use of this machine, since they have learned to use it, the men doing the same work (cutting, scraping, breaking down the coal, loading it into the mine cars) are producing about 4 tons per man hour, or 35 tons per day per man.

For all the time the machine has been in operation, from December 1, 1923, until the present, and for the entire 115,000 tons which it has cut and loaded since being installed, including the period of experiments and subsequent changes, it has averaged 1.667 tons per man hour.

The greatest production from this machine in one month (March, 1925) was 10,000 tons.

This machine will work in any thickness or inclination of seam, or in any place where a man can work by hand.

This machine draws the ribs, or cuts and loads coal from ribs, and so controls the roof pressure that the coal falls without any, or very little, blasting, thereby largely eliminating both the drilling and blasting, as well as the explosives used for blasting; explosives used equaling only 1 pound per 75 tons, while by our old, or what is called the present method, we get only 7.3 tons of coal per pound of powder, or one-tenth as much.

We are now constructing another machine embodying many improvements which we believe will give an average performance equal to our present best performance, or 5 tons of coal per hour per man, every hour worked throughout the year, and the coal so produced will grade 25 percent more than commercial coal; that is, coal above ¾ inch in size, than coal mined by the present methods, or by hand. It will also mine and load 85 percent of all the coal in the seam, which will be a decided economic saving to the nation, as compared with the present method of so-called machine mining, and still further and of still more importance, the men working on this machine work in groups of eight or ten, in well-ventilated and well-lighted places, under (*Continued on page* 311)

SIMPLIFIED METHODS IN LOCOMOTIVE HAULAGE

While Each Property Presents A Problem Of Varying Conditions, Locomotive Haulage Is An Important Link In Mine Productions—Advantages And Disadvantages Of Steam, Oil-Electric And Electric Locomotives Discussed

By H. C. GOODRICH*

THE transportation of ore and waste is essentially a part of every mining operation that is of prime importance in bearing upon production and cost. Locomotive haulage is accordingly a subject that we can well afford to seriously consider as a possible means for further elimination of waste. Any saving that can be effected is highly desirable not only from the standpoint of good management but because of the ever increasing foreign competition.

While standardization of haulage equipment might seem to suggest possibilities of cost reduction it must be appreciated that this might, if carried too far, render difficult the selection of suitable equipment for special operations. Such flexibility would doubtless go far to solve the haulage problem of certain producers. His selection would naturally be influenced by the personnel that would operate the machine, the facilities for maintenance, grades, loads track arrangements, length of haul, fuel and water problems—all being factors that vary at different properties and which variation suggests equipment especially designed to meet the conditions peculiar to the property.

Standardization, therefore, is limited as a means of cost reduction and leads us into the study of the different sorts now on the market. Many types of locomotives have reached a relatively high state of development and it is the purpose of this article to treat of these types and to advocate that the kind appearing to be best fitted for the particular work at hand be considered rather than a standardized unit.

When we consider the standardization of a machine, however, we do strongly advocate insofar as possible the use of standardized parts. Progress and invention reckon little with precedent and what we might consider today a standard unit for a given job may soon be superceded by something better.

STEAM LOCOMOTIVES

A few years ago, steam for the power of locomotives appeared to be yielding to other sources of energy. The effort to keep steam power in service in preference to electric or other power is bringing forth many new devices, some of which have considerable merit and which will be a leading factor in locomotive construction within a few years, but, at the present time are only in the beginning and the practical results over a number of years are yet to be learned. Superheaters, feed-water heaters, arches and arch tubes, boosters and other improvements have resulted from the labors of designers of steam locomotives. These men have been inspired by a determination to keep steam power supreme. The improvements have all been so successful that the threatened entire supplanting of the steam machine has to date not materialized. It must be noted, however, that as attempts have been made to improve steam locomotives thermally, that is, higher steam pressure, superheat, stokers, etc., their cost of maintenance has increased.

Steam Locomotive

The fuel and water problems so far as they effect the generation of power on a mining property are varied, but are always important. The conservation of fuel, whether it be coal or oil, is of steadily growing importance and cannot be disregarded by those who are charged with the responsibility of fuel consumption.

As a means of reducing fuel and water consumption on steam locomotives, as well as increasing the hauling capacity, the further extension of the use of superheaters and feed-water heaters may be commended as a progressive step.

The use of superheaters by companies operating surface mining properties and in similar industries using the steam locomotives, for hauling has been gaining ground during the past few years. The relatively high price of the fuel, as well as water consumption, which in many instances, involves considerable expense where water is scarce or of inferior character, produces a keener appreciation of the advantages to be obtained from the use of superheated steam.

A brief description of the device may be of interest to those not familiar with it.

The superheater consists of a header casting located in the smoke-box and connected to the dry pipe in a manner similar to an ordinary tee-head, which it replaces. This header has compartments for superheated and saturated steam.

A series of double loop pipes, called superheater units, are connected to the header. Each unit enters a flue somewhat larger than the ordinary boiler tube and extends to a point near the firebox tube sheet. The steam pipes to the cylinder are connected to the superheated side of the header casting.

The steam flows from the dry pipe into the saturated side of the header to which one end of each superheater unit is attached and then through the units in parallel, returning to the superheated chamber in the header casting to which the other end of the superheater unit is attached. Thence to the cylinders through the usual steam pipes. It is while passing through the superheater units which are in contact with the heated gases of combustion that the temperature of the steam is raised to the specified degree.

The properties of superheated steam which makes its use more effective and more economical in small locomotives may be briefly outlined as follows:

First.—It does not condense until its temperature has been reduced to that of saturated steam at the same pressure.

Second.—It has a greater volume per unit of weight than saturated steam at the same pressure. As its temperature increases, so also does its volume.

Third.—It has a lower thermal conductivity than saturated steam. Less

*Chief Engineer, Utah Copper Co.

heat will be absorbed by cylinder and pipe walls per unit of time.

The practical advantages which result from these properties of superheated steam are in general as follows: An increase in locomotive capacity, a saving in fuel, and a reduction in the amount of water used by the locomotive boiler.

Because superheated steam has a larger volume per unit of weight, less steam is used by the engine cylinders to produce the same horsepower output. In an engine using saturated steam, an average of 27 pounds of steam per horsepower is required; in a superheated engine this steam consumption is reduced to 19½ pounds. This saving in steam becomes still greater because of the elimination of condensation in the engine cylinder. The condensation in small locomotive cylinders where saturated steam is used is ordinarily high, hence, there is a great saving which superheated steam effects by eliminating this loss.

As a direct result of the saving in water evaporated by the boiler, a corresponding saving in fuel consumed under the boiler results from superheating.

Another direct effect of the reduction in steam consumption is the fact that the capacity of the locomotive is increased. Because the demand on the boiler for steam is reduced, a boiler steam reserve is built up which is available for increased power demands on the locomotive. With the increased capacity available by superheating, four superheated engines can do the work of five similar engines using saturated steam—a distinct advantage where small saturated steam locomotives are worked to the limit of their capacity and service requirements might call for the purchasing of new locomotives.

Feedwater heating has long been recognized in industrial and marine practice as an essential part of an efficient power generating installation. For many years efforts have been directed towards the adaption of feedwater heaters to locomotive service. The requirements of the locomotive as to bulk and weight of auxiliary equipment have made the solution of the feedwater problem somewhat more difficult and delayed its introduction. During the past six or seven years, however, the problems have been satisfactorily solved and feedwater heaters are being applied to locomotives in increasing numbers and with excellent results. In all of these installations, the economies have been obtained by the reclamation of heat contained in the steam exhausted from the cylinders which hitherto has been entirely used for producing draft and which has been ejected from the stack with the gases of combustion.

Feedwater heaters using this exhaust steam may be divided into two classes; first, those using a reciprocating pump for injecting the feedwater into the boiler; and second, those using the jet injector principle, commonly termed the "exhaust steam injector."

The selection of either the pump, or the injector, feedwater heater, is governed by conditions of operation which should be studied in each particular case. With either form of feedwater heater there is the opportunity to reclaim from 12 to 15 percent of the heat in the exhaust steam, leaving a sufficient amount of the exhaust to meet the now decreased draft requirements. The steam which is condensed is also reclaimed and becomes part of the feedwater. The heat reclaimed is adequate to raise the temperature of the feedwater up to 225° F. at the point of its delivery into the boiler. The reclamation of water results in a saving of the amount of water taken from the water station and in the same degree reduces the amount of scale-forming substance which enters the locomotive boiler. This is so because of the fact that the reclamation of exhaust steam is actually the reclamation of distilled water. The fuel saving which results from the use of feedwater heating exceeds the steam saving. This is due to the fact that the reclaimed heat, put into the boiler with the feedwater decreases the amount of fuel required, for a given output of the locomotive. The boiler is then working at a lower rating; its efficiency is higher than before. This increase in boiler efficiency contributes to the fuel economy. Carefully conducted tests on coal burning locomotives have clearly shown that either the pump-driven or the injector-operated feedwater heater, at normal locomotive operation, will produce fuel savings of between 6½ percent and 19 percent.

Firebrick arches of proper design, supported on water circulating tubes in the firebox are in satisfactory service on mine locomotives. The improvement in efficiency of combustion; the general improvement in water circulation in the boiler as a result of the use of water tubes; the greater freedom from cinder and ash deposits in the boiler tubes and the better protection of the firebox end of the tubes from temperature fluctuations, are advantages which are translated into fuel economy and decreased boiler maintenance.

The three devices above discussed for improving the efficiency of locomotive haulage are the outstanding improvements in modern locomotive practice and their introduction into the locomotive haulage problem of mining companies will doubtless go forward more rapidly than in the past.

Oil Electric Locomotives

The internal combustion engine is an efficient form of prime mover. The electric drive offers efficient and easily controlled form of power transmission. A combination of the two suggests possibilities of far-reaching development in mine transportation. A recent development of this combination demands some consideration in an article of this nature and I believe a brief description is pertinent.

The oil engine is of the vertical, six-cylinder, four cycle, single-acting, variable speed type, having direct fuel oil injection cylinders. Cylinder heads and combustion chambers are water-cooled. Fuel oil injection is accomplished by means of spray nozzles in each combustion chamber to which oil is delivered under pressure by an injection pump driven from the main shaft. Compressed air is not used for fuel injection and ignition is by compression heat only. One fuel injection pump serves all cylinders. The fuel oil distribution is accomplished by a distributor timed to admit oil to the spray nozzles of the cylinders in proper firing order. Clean hydro-carbon oil with a viscosity at 70° F. and a flash point not lower than 150° F. is used as fuel. The lubricating system is of the force feed type. Oil in contact with the cylinder walls is passed through a filter and returned to the crank case. A closed water system is used for cooling the water, being circulated by a centrifugal pump driven from the crank shaft. The cooling water temperature is regulated by a thermostatic valve controlling the circulation of water from the engine to the radiators located on the cab roof. Initial starting air is compressed by small auxiliary compressor to approximately 200 pounds pressure to start the engine. This compressor, driven by the engine, automatically maintains continuous pressure in the starting reservoirs. The generator is separately excited and direct connected to the crank shaft of the engine. The combined characteristics of generators and exciters are such as to produce a machine of practically constant output. The output of the generator varies with the output of the engine and at any position of the throttle is constant throughout the whole working range of the power plant.

The control of the locomotive is extremely simple, there being a throttle lever controlling the engine output, and a master controller connecting the traction motors in series or in parallel for forward or backward motion. No rheostats are used in the power circuit. The oil electric drive seems to offer some distinct advantages, as the thermal efficiency of internal combustion engines is considerably greater than of the steam engine.

Sixty-Ton Oil-Electric Locomotive in Hillside Yards, Long Island Railroad

Combined Storage Battery and Trolley Locomotive

Electric transmission protects the engine from shocks to which it is subjected with mechanical driving transmission between engine and drivers. Electric transmission is equivalent to a gearing with an infinite number of gear changes. Electric transmission has advantages over gear transmission in that it is self-shifting. The speed ratio between the generator and the driving motor automatically adjusts itself to meet the demand of the service.

The combination of the oil electric drive has given economical results in actual railroad yard service of such significance as to warrant its consideration with other types as a possible solution of locomotive haulage problems. It is particularly destined to fit where the application of steam or hydro-electric energy becomes an economic problem.

Electric Locomotives

Electricity is persistent in its bid for supremacy as a source of power with respect to mining transportation. This is so because of its economy and its adaptability in the field of frequent short hauls. The electric locomotive in one form or another should always be taken into serious account when locomotive haulage is under consideration.

In thinking of electric locomotives as applied to locomotive haulage, three types suggest themselves: The storage battery locomotives, the combined storage battery and trolley locomotives, and the trolley, or third-rail locomotives.

It would seem that the combined storage battery and trolley locomotive will go far in overcoming the prejudice heretofore directed against electric operation of locomotives in open pit mining work because it has been considered unsatisfactory to use a third-rail, catenary, or trolley construction in connection with tracks that are frequently moved.

Storage Battery Locomotives

While it must be admitted that there are limits to the practical application of the storage battery type of locomotives, the fact that such locomotives weighing four to seventy-five tons have been built and are in successful operation, goes far to show that there is a field for this type of haulage equipment. It is, of course, limited to the shorter hauls.

Combined Storage Battery and Trolley Locomotives

The storage battery type of locomotive is also made for combination battery and 250-volt trolley operation. The combination of the storage battery and the trolley makes possible the use of this type of locomotive where the supply of energy exclusively by means of trolley or third rail would prohibit its use.

Locomotive haulage investigation would not be complete without the consideration of the combined trolley and storage battery type, as there are conditions to which it would better apply than the other types.

Trolley Locomotives

In this group, are classified the electric locomotives that are supplied with energy by catenary, trolley, or third-rail systems.

The electric locomotive is a much simpler machine than the steam locomotive. The machinery is less complicated in locomotives using the direct current than in the case where alternating current is used. However, the alternating current machine is perhaps much easier to understand, handle and repair, and is much less subject to disorder than is the steam engine. This promises much and the contention is advanced that the electric locomotive is normally more easily and cheaply maintained than the steam locomotive.

Electricity as an agent of power development is essentially different from steam. The electric locomotive is increasing in durability and simplicity, but it will probably never be the fool-proof and rugged machine that the steam locomotive is. On the other hand, the steam locomotive will probably not reach into all the zones of usefulness that are open to the electric engine.

While it is possible normally to keep the maintenance and repairs of the electric locomotive down to a point considerably less than those of the steam locomotive under favorable conditions of steam maintenance, this necessitates rigorous and careful inspection and conformity to rules of operation, due to the peculiar nature of the electric locomotive. If electric engines are handled as has been the custom of treating some steam locomotives, then it is likely that their repairs, instead of costing less, will cost more than those of steam engines. It is probable that the mere simplicity of the electric machine as compared with steam is not sufficient by itself to tip the balance of justification for its adoption in lieu of steam. However, other factors are often present, such as fuel problems, that would add enough to the balance to give it a decided inclination to the choice of electric operation.

In concluding, cognizance must be given the fact that locomotive haulage is an important link in the chain of mine production and as such it warrants due and careful consideration, and presents a field in which there is prolific opportunity for decreasing costs by the adoption of the most suitable equipment obtainable for the job at hand.

Arbitrary, or common standard rules covering railroad locations, grade, curvature, etc., cannot be laid down as these are peculiar to the topography of the location. These are important factors, however, in determining the proper equipment, which in turn influence the weight of rail to be selected. Each property presents a problem made up of all sorts of (*Continued on page* 316)

THE NATION'S VIEWPOINT

A Digest Of The Expressed Opinions Of Leaders In American Affairs

WITH the possibility of an extra session of Congress being called to consider revision of the national tax laws, any utterance of the **Hon. Andrew W. Mellon**, *Secretary of the Treasury*, is of unusual interest. In a recent address before the Mississippi Bankers Association, Mr. Mellon points out that:

"One of the most promising aspects of the whole tax controversy now before the country is the wholesome revival of interest in the division of taxing powers between the federal and state governments. In fixing rates, whether they be normal taxes, or surtaxes, or death taxes, the controlling factor should be the effectiveness of the rates in producing revenues, not only for the year in which they are levied but over a long period of years. We want a tax system which produces revenue. We do not want merely a gesture in taxation. It is obvious that we must reform the tax system by lowering the rates to a point that will bring wealth back under taxation and force it to carry its share of the tax burden. Furthermore, tax reform in my opinion involves more than merely saving the productivity of the rates. It implies ultimately the preservation of the income tax itself; and that is a matter which should give us great concern.

"The levy of an income tax, at proper rates, is a fair and economically sound means of raising the immense revenues required for the operation of the government. But the tax must not be levied at rates so high as to hamper business, slacken initiative, distort investment, and encourage avoidance of the tax. If the position of the income tax is to be made secure, we must preserve its essential integrity. We must give to the country a law which closes the most obvious doors of escape from taxation, without at the same time exposing the law to contempt by loading it down with complicated provisions, aimed at but unsuccessful in stopping tax avoidance.

"Our present law has many of these defects. It levies rates so high as to encourage tax avoidance. At the same time it is full of complicated provisions which seek to close all the doors of escape. The result is to increase the difficulties of the taxpayers and to induce sometimes a feeling of annoyance and resentment on their part at a law which makes compliance with its provisions so difficult.

Wallace Press-Times

It's No Use, They Can't Read

"In the Revenue Act of 1924, something was accomplished in the way of structural and administrative changes, which seek to simplify and improve the operation of the law and to lessen tax avoidance. There is a practical limit, however, to the efforts which may be made in closing all the holes in the law, by means of which tax payment is evaded. To close all possible avenues of escape would put business in a straitjacket and tie up many legitimate dealings in property. Business must be allowed a reasonable amount of freedom if it is to expand and prosper; and, unless it does expand and prosper, the income tax will prove but a barren source of revenue.

"In trying to reform the law, two courses are open to us. One is to deal promptly and effectively with the tax-exempt security problem. There are at the present time over $13,000,000,000 of tax-exempt securities in this country, mostly in state and municipal bonds. This amount is increasing at the rate of about a billion dollars a year, so that there is no dearth of nontaxable securities for the man who has a large amount of capital to invest.

"There is no immediate remedy for the situation within the power of Congress except a readjustment of the surtaxes on a basis that will attract capital back into productive business and keep it from exhausting itself in tax-exempt securities or from taking advantage of the many other methods of investment by which taxes are avoided. This is the second course and the only one now open to us.

"If our present excessive rates can be reduced and still yield sufficient revenue for the government's needs—and in all probability lower rates will produce greater revenue than the present ones—and if at the same time by reforming the tax system we can remove influences which threaten to retard our normal, healthy development, then why should we hesitate to do what honesty and intelligence seem to dictate?"

At the meeting of the American Zinc Institute, recently held in St. Louis, **S. A. Trench**, *of C. S. Trench and Company, New York*, made a strong argument in favor of greater cooperation

"Taking" *N. Y. Evening Post*

Ohio State Journal
The Junk Collector

between the mining and smelting interests. In part, he said:

"Various attempts have been made to establish a sliding scale contract on zinc ore but without success. But I am not aware that any of these proposals covered a sliding scale both as to tonnages as well as prices. By way of concrete suggestion, which after all is what is wanted, why not consider the pros and cons of a *truly* sliding scale contract. The ore producer naturally does not wish to be bound to furnish a certain quantity of ore at unknown prices dependent on the price of metal, with perhaps the underlying suspicion that the market is being manipulated to his disadvantage. But how about devising a contract under which maximum and minimum tonnages are specified within reasonable limits, high and low, that automatically becomes void when prices exceed or fall below those limits. A contract governed by mining costs as one basic point, with due recognition of smelting costs which is another basic point, within such ranges as both interests can mutually agree upon, with an expanding differential as prices advance, modified also according to the tonnage of ore taken. The main idea is to keep the "dog fight" out of the general normal market—confining the scrapping to the areas of extremely high and extremely low prices instead of letting it range all over the lot as at present. Would not this be practicable?"

The New York Evening Post paints a very gloomy picture as to the future of the bituminous coal industry in a recent editorial on "Strangling the Soft-Coal Industry." Their summary of the cause, effect and possibilities of the depression now at the throat of the industry, is as follows:

"Failure of the two 'coal banks' this week in the Pittsburgh district is blamed upon the Pennsylvania phase of a soft-coal situation now threatening to become a national problem before the end of the summer. Those involved assert the bottom has dropped out of the bituminous industry. 'Frozen assets' is the official diagnosis, and back of the crash, says the State Secretary of Banking in Pennsylvania, is the

> . . . stagnation that has obtained in the bituminous coal industry of Pennsylvania for some months.

"This 'stagnation" is not confined to the Pennsylvania fields. Nor is it due primarily to conditions peculiar to that troubled area. Whatever other causes may lie back of the Pittsburgh bank failures, it is common knowledge that the soft coal industry is not generally prosperous. It has not been for more than a year.

"The seeds of the trouble that has sprouted in the Pittsburgh district were sown one day in February, 1924, when the present three-year wage scale was signed by soft-coal operators and the United Mine Workers of America at Jacksonville, Fla. The Jacksonville agreement continued the war-wage scales. Under it, John L. Lewis, president of the miners, hoped to 'shake' some 200,000 men out of the industry, and during its three years of truce he planned to unionize the West Virginia fields.

"Since February, 1924, mines have closed by the score in the unionized central competitive field. Thousands of miners, thrown out of work, have strayed over the country looking for jobs. The Illinois situation seems the worst in the field comprising that state, Indiana, Ohio, Kentucky and Western Pennsylvania. Illinois has some 300 mines that are real producers. About 100 of these are working now. Not more than half of her 100,000 miners have work. Her mines, 100 miles out of Chicago, are being undersold, despite freight costs, by nonunion West Virginia. Financial interests backing her mines are having their troubles.

"Similar conditions exist in Indiana, Ohio and Pennsylvania. A Pittsburgh concern formerly operating 58 mines had only 18 working last year, and six of these are about to be closed. Still another soft-coal company, in business 45 years, shut down on April 1.

"Miners and union operators alike overreached themselves in the Jacksonville agreement. Nonunion West Virginia has taken the coal business away from the central competitive field. Its mines produce coal from 35 to 40 cents a ton cheaper than is possible under union wage scales. Union mines are under a 35 percent handicap, as the Locomotive Brotherhood's mines discovered before they turned nonunion. The Jacksonville agreement cuts the throat of union miner and union operator alike.

"The strike called by the United Mine Workers in Northern West Virginia April 1 is the union effort

WELL, WELL, WELL. KITTY'S COME BACK. POOR THING, HOW HUNGRY YOU LOOK, COME IN AND I'LL GET YOU SOME NICE WARM FOOD
WILD-CAT SPECULATION
INVESTING PUBLIC
EXPOSURE
PROSECUTION
INDICTMENT

The Prodigal's Return

to break the stranglehold now choking union fields. If that grip is not broken, the present wage scale cannot last and the Jacksonville agreement must go. John L. Lewis has gambled his prestige and the future of his union on his ability to smash nonunionism and create a national mine-labor monopoly. He forced the agreement on the understanding that he would pull the nonunion thorn from the flank of the unionized fields.

"Meanwhile, this agreement is smashing the industry that has fed, clothed and sheltered his followers. Half-opened Illinois shafts are deserted. Old mines are closed. Companies with coal uncovered, machines placed, tracks laid and towns half built drop out. Union miners, throwing away their cards, head for West Virginia and a nonunion job. Operators who went along with Lewis, playing his game, sadly watch their business drift away to West Virginia shafts.

"Present soft-coal troubles trace directly to the Jacksonville agreement. The situation is further complicated by chances of trouble in the hard-coal fields when the anthracite truce expires on September 1. With soft coal hog tied by the Lewis-drawn agreement, strike clouds over West Virginia and 'stagnation' apparent over great reaches of soft-coal country, the stage is being set for trouble. Unless the Jacksonville agreement can be ended or modified, Old King Coal may be holding the national spotlight before the birds go south or Congress meets again."

Stabilization of the mining industry has been a subject to receive the consideration of the leaders of the industry in the most serious manner. It is therefore interesting to note the comment recently published in *The Manufacturers Record*, which says:

"It is with particular interest that we note in recent Washington correspondence that the stability of the mining industry will become a prominent public issue during the next year. It is said that Secretary Herbert Hoover, by virtue of the profession of mining engineering to which he was trained, has responded with alacrity, and that conferences on the subject are in progress. A remedy aimed at is said to be that of seeking legal authority for consolidations, encouragement of larger units and controlled production. It is justly claimed that the present methods result in mining the higher-grade ores, thus leaving the lower grades in caved and inaccessible workings, effectually preventing their ultimate utilization, despite future improvements in mining and in metallurgical treatment. This is all true. Moreover, to take one industry as an example, copper is selling today at a slightly lower price than the average for the past 30 years. The costs of production have greatly increased. Not only has the value of the dollar been reduced by about 50 percent in that period, but labor costs also have increased, if not in proportion to the purchasing power of the dollar, at least about 30 percent. By means of rigid economies and by improved machinery, and better extraction metallurgically through the use of the modern system of flotation, the costs have not kept pace with the shrinkage of the dollar. Nevertheless, it is wasteful of our national resources, even if the better circumstanced copper companies are able to operate without loss under such conditions.

"It seems quite improbable that any great new mines will be discovered. The country has been searched, and today men do not stumble upon copper properties; they seek them through applied geology, at vast cost, and the chances of finding more are lessening daily. In the United States there remains about 30 years' supply at the present rate of production. After that period there will in all probability not be more than 10 or 15 percent of the present tonnage of domestic copper marketed. Without copper in great quantities we could not maintain equipment to meet an enemy. This is a case where conservation assumes first-rate importance. Our national insurance depends on remaining self-sustaining as to that metal. Our lead resources are declining also, and the world is being combed for more. Under such conditions restriction in output is clearly necessary for the well-being of the American people. That implies increase in price. It has to come or we will become dependent on other nations, and without an adequate navy we cannot expect to control the seas so as to import articles needed at a time of stress."

Haunted — *Wallace Press-Times*

Much interest has centered around the utterances of **William Green**, *president of the American Federation of Labor*, and much of commendation is heard concerning his conservative attitude. In a recent editorial the *Black Diamond* says:

"'Between capital and labor there is an interdependence so fixed and irrevocable as to make complete success attainable only through cooperation and understanding.' Wise words, these, which were recently spoken by Mr. Green. It is worthy of note, however, that they are spoken by Mr. Green in his capacity as president of the American Federation of Labor rather than as member of the United Mine Workers of America.

Jolly Well Out of It

Wallace Press-Times

All Work and No Play

Peaceful settlement is the present aim of organized labor, said he, and strikes are becoming obsolete as an industrial weapon. It is too bad that Mr. Green cannot inculcate some of his ideas into the officials who head the miners.

"Strikes, with all the frills of violence, crime and intimidation are the only weapon known to the miners—avowedly so since they consistently and persistently refuse to listen to arbitration, compromise or any variation thereof. Mr. Green, by his idealistic language, indicates either that he has departed far from the teachings of his former chief, Lewis, in a short while, or that he was a minority in the Mine Workers administration before his elevation to his present position.

"There is always a strike in the Mine Workers' ranks. Right now Nova Scotia is tied up with the usual accompaniment of broken agreement, financial loss and hungry men, women and children. Another strike, which by the way, bids fair to develop into a gigantic fiasco, has been called in West Virginia in a desperate attempt to coerce the nonunion elements in that state into the union ranks. And through the passage of the months and years it is seldom that a week passes without the perpetration of a dynamiting, sharp-shooting or slugging outrage.

"It would be well for William Green, erstwhile secretary of the Mine Workers and present president of the American Federation of Labor, to, by some means, inculcate some of the high minded principles expressed in the quotation which heads this editorial, into the responsible minds which guide the destinies of the miners' unions. Were that possible it would work to the very great benefit of the miners, the mine owners, and the United States."

With the rapid increase in employe ownership of stock, less is heard of "profit sharing" plans. *The Corporation Journal* publishes the following interesting statement on this question:

"A great deal has been said about the desirability of a distributing of profits of an enterprise so as to give to all the employes concerned with their creation a fair share. The appearance and disappearance of various profit sharing schemes have taken place in the last few years. Profit sharing through the ownership of stock, however, seems to have taken a firm hold. Not long ago Swift & Company, the meat packers, published an advertisement entitled "Who is Swift & Company?" It was stated that the company was owned by more than 40,000 people scattered all over the globe. Nearly 14,000 of these were employes of the company. Many other corporations have recently made known large amount of stock-holdings by employes. A notable example is The American Telephone & Telegraph Company. The New York Trust Company recently published the following facts in connection with employe ownership:

"'Studies of returns filed under the federal income tax law indicate that for dividends derived from ownership of stock, the largest increase within recent years has been in that class of the population whose individual incomes have not exceeded $5,000.

"'Stock dividends received by persons in this income class in 1917 were 9.5 percent of the total for all persons filing returns. In 1921 this proportion reached a peak of 22.7 percent and has declined slightly since that time.

"'This fact suggests a tendency toward ownership of corporations in this country by the wage earners.

"'The figures of stock ownership of the railroads of the country are perhaps the most accurate of any, because complete reports are filed, in accordance with law, with the Interstate Commerce Commission. At the present time the stocks of class I railroads are held by more than 807,000 people, and the average holding per stockholder is $9,110. In 1915 the total number of stockholders was only 511,000 and the average holding $13,361.

"'The increase in the number of railroad stockholders and the decrease in the average holding, while not so pronounced as in the case of industries generally, is more remarkable because in the decade 1914 to 1924 practically no new railroad stocks were issued.'"

ANNUAL MEETING AMERICAN ZINC INSTITUTE

Successful Meeting Of Zinc Producers Held At St. Louis—A. P. Cobb, New Jersey Zinc Company, Is Elected President

By J. H. WADLEIGH*

A. P. COBB, of New York, vice-president of the New Jersey Zinc Company, was elected president of the American Zinc Institute, to succeed Arthur E. Bendelari, of Chicago, vice-president and treasurer of the Eagle-Pitcher Lead Company, at the annual gathering held at the Statler Hotel, St. Louis, Mo., April 27 and 28. Mr. Bendelari, Jesse G. Starr, of Joplin and John W. McCarthy, of New York, were elected vice-presidents. Howard I. Young, of Mascot, Tenn., treasurer and Stephen S. Tuthill, secretary, were re-elected.

Messrs. Cobb, Bendelari, A. M. Gaines, of Picher, Okla., Charles T. Orr, of Webb City, Mo., E. H. Wolff, of Joplin, J. F. Robinson, of Miami, Okla., and William Rossman, of St. Louis, were elected directors for a term of three years. John W. Newton, of Picher, who had been nominated withdrew in favor of Mr. Robinson. At a later session it was voted to increase the directorate from 21 to 24, and in accordance Mr. Newton, L. E. Wemple, of Peru, Ill., president of the Illinois Zinc Company, and Charles A. H. De Saulles, of New York, were elected to the directorate.

The opening session of the meeting was devoted to remarks by President Bendelari, and welcoming address by Hon. Victor J. Miller, mayor of St. Louis, a former resident of Joplin and the mining fields, to which P. B. Butler, of Joplin, manager of the Barnsdale Zinc Corporation replied. An interesting letter on the world's zinc situation, written by A. J. M. Sharpe, of London, honorary member and foreign correspondent of the A. Z. I., was read by the secretary. The morning session was closed by an address by Adolph Bolt, of the Chamber of Commerce of the United States.

The afternoon session of the first day was the outstanding meeting of the gathering. The discussions following the reading of papers by E. H. Wolff, on "The Miner's Viewpoint," and L. E. Wemple, on "The Smelter's Viewpoint," was only stopped when President Bendelari appointed a committee of six, composed of Butler, Newton and F. C. Wallower, representatives of the mining interests, and E. W. Furst, of the Grasselli Chemical Company, William A. Ogg, of the American Zinc Lead and Smelting Company, and Julius Hegeler, of the Hegeler Zinc Company, as representatives of the smelting group. In appointing the committee, the president stated that it was hoped that they could work out some plan by which the "fence" that now existed between the two ends of the industry might be torn away.

Mr. Wolff read his paper first, and the usual discussion of the paper was delayed, on request of Mr. Cobb. He expressed a desire to have the smelters' viewpoint, as expressed in Mr. Wemple's paper, presented. The request was readily granted and the paper read.

"Diversification" and a threat of the smelters to mine their own ore supplies were the high points in Mr. Wemple's paper, with a parting prediction as follows:

"It is not an improbable prediction that a few years hence, the ore producer, regardless of all the present estimates and guesses as to how long the ore supply will last, will find himself without a market for his ore. The ore producer does not differ from the producer of any other commodity in that his product is valueless until it finds a market without in turn hurting his own interests. As outlined before, the ore producers' market has been already curtailed and he cannot expect the smelters to do other than adapt their smelting plants to produce commodities in which there exists more profit than smelting ore for the slab zinc market."

Mr. Wolff stated that he realized that the zinc industry as now conducted was a continual contest to financial advantage in the ore field. "The miners are justified in trying to get a fair price for their product," he said. Also, "I believe that the day has passed when the miner will exhaust his mineral deposits and sell them at a price less than cost of production."

Two avenues of possible relief to the smelter's complaint of "no profit" were offered by Mr. Wolff.

First: "Some years ago as a smelter man, I advocated the use of contracts in the industry, believing that a more stable raw material would permit the smelter to operate more intelligently with regards to the selling price of his product. At that time a few were interested, but no apparent effort was made to learn the view of the majority. I still believe contracts would solve our most difficult problem, but if the smelters side of the industry is satisfied to let things drift along without profit to themselves and make no effort to bring about better conditions, why should the miner worry except to get a fair price for his ore, and prevent loss to himself."

Second: "Before the war, very little slab zinc was sent out of the country and the smelting industry was probably more profitable than it has been over the past year or two, during which time there has been more slab zinc exported than ever before. Out of your monthly production you have been exporting 10 to 15 percent, and the sale of this small part of the entire production has set the price for all of it. I believe the entire industry would be better off if we were back to the basis of no exports, but failing that, why compete for the opportunity to export at a less than cost price, if it brings a loss? One smelting company could easily satisfy all export demands for slap zinc, and if that company refused to sell, except at a fair price on this side, we would soon be free from the dominance of the European market. Looking upon the situation as a miner, you smelting people can put your own house in order without help from us, but if you want our cooperation, I feel sure the doors are open to you."

The discussion of the two papers was begun by James F. Callbreath, secretary of the American Mining Congress, who stated the attitude of the organization towards the mining and smelting industry and who expressed a hope that the two ends

Annual Dinner of the Zinc Institute

* Joplin, Mo.

of the zinc industry could be brought to some understanding.

Mr. Cobb stated that a "fence" had been erected between the two ends of the industry and expressed a desire to erase that fence.

The discussion was then continued by Fred N. Bendelari, of Joplin; A. M. Gaines, of Picher; John W. Newton, F. C. Wallower, M. F. Owens, of Miami; Mr. Tuthill, W. N. Smith, Mr. Ogg, F. W. Holler and Arthur Thatcher, of St. Louis. The laws of the land, the Federal Trade Commission and the operators problems and an invitation to the smelters to enter the mining business were covered by these discussions, and which as stated were brought to a close by the appointment of the committee of six.

The discussions were followed by a paper on "The Broker's Viewpoint," by S. A. Trench, presenting the evident meat on which the committee was to feed.

Mr. Trench said: "Various attempts have been made to establish a sliding scale contract on zinc ore but without success. But I am not aware that any of these proposals covered a sliding scale both as to tonnages as well as prices. By way of concrete suggestion, which after all is what is wanted, why not consider the pros and cons of a truly sliding scale contract? The ore producer does not wish to be bound to furnish a certain quantity of ore at unknown prices dependent on the price of metal, with perhaps the underlying suspicion that the market is being manipulated to his disadvantage.

"But how about devising a contract under which maximum and minimum tonnages are specified within reasonable limits, high and low, that automatically become void when prices exceed or fall below those limits? A contract governed by mining costs as one basic point, with due recognition of smelting costs, which is another basic point, with such ranges as both interests can mutually agree upon with an expanding differential as prices advance, modified also according to the tonnage of ore taken. The main idea is to keep the "dog fight" out of the general normal market—confining the scrapping to the areas of extremely low prices instead of letting it range all over the lot as at present. Would this not be practicable?"

James Schermerhorn, a former newspaper man of Detroit delivered an interesting talk at the banquet, at which President Bendelari acted as toastmaster. The speech was preceded by a number of vaudeville acts.

The morning session of the second day was devoted to the election of directors, reading of the report of the directors and by papers and letters.

A letter by Robert Lepsoe, on "Electrothermic Zinc Smelting" was read.

"The Story of Fire Clay Refractories," by L. M. Richards, consulting engineer and economic geologist was augmented by moving pictures, after which a lively discussion on cost of retor replacements was held by the smeltermen.

The morning session was brought to a close by the reading of a paper on "Zinc Coating," by C. S. Trewin, of the technical department of the New Jersey Zinc Company.

Mr. Butler reported for the committee of six at the concluding session. He stated that a number of interesting meetings had been held, but that the magnitude of the subject and the lack of definite information made it impossible for the committee to arrive at any definite solution. He asked that the committee be instructed to continue its efforts to work out a plan that would solve one of the industry's most difficult questions, with authority to report back to President Cobb in the future. Such a request was granted by the members.

The mooted question of national advertising zinc, which has been the favored topic of the last two annual gatherings was sidetracked until the closing hour of the last session. At that time President Bendelari said, "I see old man advertising and publicity at the door and he is seeking recognition, what will you tell him?"

In 1923 the organization agreed to raise a sum of money and advertise zinc. At the 1924 annual meeting the question was again broached. At that meeting it was agreed that a fund of $100,000 be raised and expended for the advertising of zinc.

President Bendelari, immediately on his return to Joplin, where he then resided put on a campaign and raised the mine operators $50,000 of that sum.

The smelters have failed to raise their $50,000 quota.

As no one seemed to be willing to start a discussion, President Bendelari asked that the incoming president, Mr. Cobb, who would have the responsibility and duties of the office to fill the coming year, to express his opinion.

Mr. Cobb, in making his remarks, qualified them by stating that the New Jersey Zinc Company had budgeted its share of the smelter's quota. He advanced three reasons as he viewed the situation why the smelters in general had not raised their share of the fund. These three reasons were: First: the failure to make a profit; second, fear of a shortage of ore; and third, the failure of the mining end of the industry to support the Institute in a financial manner. In addition he said that some of the smelters were fearful that the fund would be spent in a manner inimical to their interests in the industry.

Mr. Wallower answered the reasons, stating that the first two were without foundation and admitting that perhaps the mining end of the industry was remiss in supporting the Institute. In regards to the augmented fear of the method in which the fund was to be expended, Mr. Wallower stated that that was a question for the publicity committee to work out, and if any of the smelters were fearful that the galvanizing committee, of which he was chairman, would endeavor to dictate the expenditure of the fund, that they were laboring under a false impression.

The upshot of the discussion was the instructing the new president to canvass the smelters once more on the advertising question and to report to the mine representatives the outcome of the canvass. In case the smelters definitely refuse to subscribe to the advertising fund, the mining men are to be free to dispose of their $50,000 as they see fit.

A postal ballot was ordered to see if the next meeting is to be held at Hot Springs, Ark., or at St. Louis.

The meeting was closed by the reading of a paper on "Milling Methods in the Tri-State District," by C. O. Anderson, of the Bureau of Mines.

Resolutions of thanks were voted to Ralph M. Roosevelt, chairman of the arrangements committee and to the Explosive Engineer and its editor, Theodore Marvin, for the publicity extended the Institute.

The meeting, as usual, was then turned over to a round table discussion of mining and smelting problems over which Dorsey A. Lyon, acting director of the United States Bureau of Mines, presided.

MECHANICAL LOADING AT U. S. C. & C. CO.

(*Continued from page* 302)

the direct supervision of a foreman or boss, instead of being scattered by ones and twos throughout the working places of the mine, often working in dark, unlighted chambers which are at times unventilated. This will add to the comfort of the workman.

The hazard of mining will be so greatly reduced by this new method of mining and with the use of these new machines, that it will make a great appeal to the humanity of the men engaged in the mining industry.

It will also be a great asset to the mining community, as the necessity of caring for the injured and crippled will be greatly reduced, as well as being a great asset to the state and nation in the preservation of the lives of their citizens.

CONCENTRATED MINERAL DEPOSITS

MINING MEN have taken considerable interest in a bill introduced in the last session of Congress by Senator Ralph H. Cameron of Arizona which would authorize the location and purchase of lands containing concentrated mineral deposits. While the measure was presented too late in the last session to permit of action by either the Senate Committee on Mines and Mining or by the Senate itself, Senator Cameron will reintroduce the bill when Congress meets again and will urge its enactment. The bill is designed to allow the patenting of mining claims where there is no surface showing of minerals.

The bill subjects to mineral entry lands which contain concentrated minerals in horizons. "There is a great deal of mining going forward in this particular kind of land today, in fact, a major portion of the copper produced in America today comes from concentrated copper minerals which occur in horizons," said Senator Cameron. "Due to the fact that the present laws do not cover this situation, the government is patenting this class of land to many of the large mining companies of the West, or their agencies, under agricultural land laws. Patenting lands under agricultural entry is the easiest method of securing patents to government ground. It requires no development or exploration work and as a result, large tracts of land are being absorbed by the large mining companies for speculative purposes and future development. The method used in securing these patents frequently contain the elements of fraud that were used in the Northwest a few years ago in the patenting of timber lands."

The bill allows claims for 640 acre units. "The mineral deposits usually occur in irregular shapes and extend from a few feet to half or three-quarters of a mile in width," continued the Senator. "These ore bodies extend through a region at irregular intervals from three to six or seven miles long, more or less. Generally they are flat or lenticular in shape, running from a few feet to several hundred feet in thickness. Usually this concentrated ore is of lower grade than that which occurs in veins. By virtue of its being low grade ore, in order to recover it, large units are essential. Larger shafts, the caving system or the steam shovel system of mining is used; large concentrators, crushing plants and other surface facilities are necessary. Considerable space is needed for mills, concentrators and storage reservoirs for water and tailings. Probably the smallest successful mine of this type in America contains approximately 600 acres, so 640 acres has been taken as the unit of size. This would mean a group of 32 of the ordinary lode mining claims as now constituted. An area of 640 acres would undoubtedly constitute the minimum amount of land that could be utilized in a successful operation of this nature."

Mining Claims

Senator Cameron pointed out that his bill in providing for the method of locating the mining claims, follows the usual custom in mining districts. The types of monuments permitted are those in use in both lode and placer mines and have been the established custom throughout the history of mining, and there is no reason why it should be changed, he says.

The bill specifies the time, after the location notices are recorded and the location is completed, when actual work must be begun upon the claim. The period of four months is allowed after location is completed, for the reason that this is in all probability the minimum time in which many of the entrymen could get their work started. In cases where it is decided to do the discovery work through shafts, timbers and machinery, shovels, drills, dynamite and other equipment must be assembled, as well as cooking utensils and living quarters. If it is decided to use drills, drilling equipment must be brought in, probably from long distances over poor roads and under difficult circumstances. Under such circumstances four months undoubtedly would be the minimum that would be required for this purpose.

Senator Cameron says that under the present practice of the Interior Department of patenting to mining companies or their agencies, large areas of government lands of this nature have been absorbed under the homestead laws or under the scrip agricultural entry laws, without any mining development at all. Fee ownership is vested in these large companies and the ground lies idle for years before any exploration work is attempted. If the ground happens to be located under the lode mining claim act, contests develop with agricultural entrymen. The Land Offices of the West are burdened with contests of this kind. "There is no hiding the fact in the West among people who understand the situation that the purpose of both the agricultural entrymen and the mining lode claim entrymen is for the purpose of securing title to valuable mineral ground for mining purposes," the Senator said.

Exploration and Development

"Multiplicity of suits develop as a result of this condition, at great expense to litigants and the government. My bill provides a sane, safe and legitimate method whereby exploration and development of the mining industry will be conserved. It was never intended by Congress that vast areas of mineral ground should be patented under the homestead or agricultural scrip entry laws. The motive of the lode law was to encourage and secure enough development of the mining land before title should pass to the individual to demonstrate its nature. My bill cares for the traditional policy of mining sections in this direction. With this in mind the bill has been drawn to conform to a custom which is traditional in mining communities, in that it requires at least $100 worth of exploration work to be done each year for each 20 acres in the claim. This would make $3,200 worth of work upon the claim, but it would permit all of this work to be done in one spot where it would do the most good and where it would lead to the discovery of concentrating ore horizons. It might be contended that $3,200 per year would be a hardship upon the prospector and that it might eliminate him from this class of location, but investigation of the present mining lode assessment requirement will show that this new requirement would be no more severe than the present requirement for the prospector who holds a group of 32 claims. On the other hand, criticism might be advanced that $3,200 per annum is not sufficient expenditure on the part of large companies holding claims of this size and type. The answer is that at present lands of this nature are being patented in greater quantities than provided for in this bill to large mining companies without anything being expended for exploration work. They are securing their titles from the government as agricultural entries without the expenditure of one dime or one cent in exploratory or development work. As a result, large and valuable areas are absorbed with no work whatever being done upon them.

Miami Ore

"This bill, if it had been a law in the early history of the Miami mining district, would have led to the discovery of the great Miami ore body with only three years work. A shaft was dug through the overburden several hundred feet

down and revealed this great ore body. The law as it existed at that time required the scattering of work over the various lode claims under which this ground was held at that time, resulting in no deep shafts. The ore body was never discovered and probably never would have been discovered under the present lode mining requirements for assessment work. This discovery had to wait until it was taken over under the recommendation of a geologist, by an organized company, which went outside the requirements of the law in order to make the discovery. Many times the amount of money necessary to have made this discovery had been wasted about the property in shallow holes, which, if it had been allowed to have been concentrated in one spot, would have led to this valuable discovery. If it had not been for the accidental exploration thus made this deposit, which has led to the discovery of the greatest copper deposit in the world, might have been lost forever. The bill is drawn in favor of the best public policy and is a compromise to all interests concerned. The expenditure will probably be heavy for the average prospector and light for the large mining companies, but, in general, it cares for the best interests of all, encourages development of this class of mining lands, and makes for the general development and prosperity of the communities in which this type of land occurs.

"The bill provides for a possessory title which gives the exclusive right of possession during the prospecting period, which would be necessary under these circumstances, and which is the fundamental, traditional policy established by long custom in mining communities throughout the West.

Vertical Claims

"It also provides for the ownership of ore being limited in claims of this type to the boundary lines extending vertically downward. In other words, the apex laws do not apply to this class of claims. Obviously, it could not apply because there is no such thing as an apex in this kind of a deposit.

"The bill provides for the usual method of patenting claims under Section 2325 of the Revised Statutes.

"The bill gives prior right to holders of this type of land who are working on the lode mining claim basis at the present time. It is a just provision, for there are many such locators in the West who have expended hundreds of thousands of dollars already in exploring regions of this nature. Because of this fact, they are entitled to receive prior right and to retain the lands upon which they have already started their exploration work. They are entitled to an opportunity to complete the work which they have begun."

BUREAU OF MINES TRANSFERRED TO COMMERCE DEPARTMENT

Secretary Hoover Will Appoint Committee To Map Out Policies And Select New Director To Succeed Bain, Who Retires

BY an Executive order issued by President Coolidge on June 4 the Bureau of Mines and the Mineral Statistics Division of the Geological Survey are transferred from the Interior Department to the Department of Commerce, effective July 1.

This action is taken in the interest of more efficiency and economy, and was recommended by Secretary Work of the Interior Department more than a year ago.

The order was issued following an opinion by Attorney General Sargent that the President was empowered to make such a transfer.

The Bureau of Mines is the second division to be transferred from the Interior Department to the Department of Commerce. The first was the Patent Office.

About a thousand employes and officials come under the Bureau of Mines, including those in Washington and those in the field. The Bureau's appropriations for the fiscal year 1926 amount to about $2,000,000, which is also transferred to the Commerce Department, together with the equipment of the Bureau.

Secretary Hoover, of the Commerce Department, stated that he proposes to appoint in the near future a committee representing the industry and the mining engineering profession from organizations including the American Mining Congress, the American Institute of Mining and Metallurgical Engineers and coal associations, to determine what the policies of the Bureau of Mines shall be, and at the same time consider the appointment of a new director for the Bureau to succeed Dr. H. Foster Bain, who is leaving July 1 to become secretary of the American Institute of Mining and Metallurgical Engineers.

In discussing the transfer Secretary Work said:

"The change is one of the reorganization plans approved by the Joint Congressional Committee.

"The primary objects of such segregation are of course to secure economy in administration and more efficient relationship with the public. As instances of the large areas of overlap between the Department of Commerce and Interior in these functions, the following may be cited:

"Our investigations show that the laboratories of the Department of Commerce carry on scientific research in the use of gasoline and lubricating oils in gas engines, while the Bureau of Mines carried on research generally into gasoline and petroleum products. The research laboratories in the Department of Commerce carry on investigation into the quality of materials for manufacture of porcelain, whereas the Bureau of Mines laboratories carried on research into raw materials for porcelain manufacture. The Department of Commerce laboratories carry on investigation into the qualities of fuel, whereas the Bureau of Mines laboratories tested fuel as to its qualities. The Department of Commerce contains a division for service in domestic distribution and foreign trade in mineral products, the Bureau of Mines carried on work of economic character of much the same implication. The Department of Commerce provides statistics of mineral production every 10 years—in some cases every two years—whereas the Department of the Interior provides statistics of mineral production every year and in many cases every month. The Department of Commerce recruits statistics on production of explosives every two years, while the Bureau of Mines procures statistics on their production at regular intervals. The Department of Commerce carries on investigations into safety appliances in various industries, while the Bureau of Mines carries on the same as applied to the mining industry. The Department of Commerce carries on research into the tensile strength of wire rope generally for all industries, whereas the Bureau of Mines investigates the strength of wire ropes for the mining industry. The Department of Commerce maintains economic research in use of raw materials for manufacture—a large portion of which are minerals—while the Bureau of Mines investigates the production of raw materials for manufacturing purposes.

"This transfer presages action by the Congress and opens the way for the transfer to the Department of the Interior of bureaus from other executive branches of the Government administering public lands and public works as recommended by this committee."

A United Press dispatch from Moscow states that Russia has awarded a 20-year concession on the Chiaturi manganese mines to W. A. Harriman and Company of New York. It gives this company the right of exploiting the fields, known as the world's richest. The American firm agrees to pay the Soviet Government royalties estimated between $1,000,000 and $2,000,000 annually.

Idaho Mines Shipping Zinc To Belgium

Mines of the Couer D'Alenes are now shipping zinc concentrate to Belgium under contracts closed recently by the Vielle Montague Zinc Company for the output of the Star mine, owned jointly by the Bunker Hill & Sullivan and Hecla companies, the Highland Surprise, the Tamarack & Custer, and the Success mines.

It is understood that the Belgium company is in the market for all the zinc it can get, a fact that has given a great impetus to zinc mining in this district.

The Interstate Commerce Commission took no action on the protest of Montana mining companies against the rates on this ore from the Couer D'Alene district to Portland, Oreg., made by the Union Pacific system, which became effective May 18.

The first shipment will leave Portland June 10, for Liege, Belgium.

British To Work Old Lead Mines

Reports from London state that a company is being formed to unwater and work 60 old lead mines in the Peak of Derbyshire, about the center of England.

Great Britain formerly produced 10 to 15 times as much lead as it does at present, but its lead ore resources have been practically exhausted. In 1923 that country consumed 34.42 percent as much lead as the United States, although only 14.32 percent as much copper.

Bureau of Mines Studying Ventilating Conditions

M. Van Sicklen, engineer for the United States Bureau of Mines, Washington, and B. O. Pickard, district engineer at Berkeley, Calif., are making a preliminary examination into mine ventilation conditions in Nevada. The ventilation investigations were decided upon some time ago, and Nevada was selected as the first state for the preliminary work, because of its reputation of having few mine accidents due to lack of ventilation.

U. S. and British Bureaus to Cooperate on Mine Investigations

An extensive system of cooperation between the British Mines Department and the United States Bureau of Mines has been submitted to Director Bain of the Bureau of Mines. The arrangement provides for a United States expert to spend several months in research work in England this year. The British representatives, who arrived here several weeks ago, and who toured the middle west under the chaperonage of Chief Engineer George S. Rice of the Bureau have sailed for home.

Airplanes Solving Transportation Problems of Remote Mining Camps

The latest styles from progressive camps include "Mining by Airplane," and, where prospecting is involved, "Prospecting de Luxe," as the Alaska Weekly puts it.

In Alaska an enterprising prospector is planning to hop off and get a birds-eye-view of unscratched possibilities. He intends to fly over the country and land at or near likely looking creeks, and, if not fruitful, go up again to take in some more. Where the country looks promising, he will leave his partner and drop over to Wrangell for supplies.

Two companies have been formed in Alaska, the Fairbanks Airplane Corporation, and the Alaska Airplane Company. The former successfully operated three planes to mining camps last summer from Fairbanks, and will soon buy a $30,000 air limousine to carry eight passengers comfortably to points in the interior.

From Nevada comes the news that the Mono Mining Company, operating the Silverado and Kentuck mines high up in the Sweetwater range has purchased a ship capable of carrying three passengers and several pounds additional. A fairly level piece of ground has been secured on the Mono forest reserve near the mine for a landing field, 9,000 feet above sea level. The company is building a 100-ton mill which will be completed late this summer and the plane will be used for flights to Minden, the shipping point; Reno, and when necessarily to San Francisco, which can be made in two and one-half hours.

Last month we carried an account of the plans of the Independent Placer Mining Company, to transport their supplies to workings in the Clearwater district of Idaho by airplane to avoid packing them for forty miles over a rugged country.

Government Sues Railroads to Recover Mineral-Bearing Lands

The Federal Government recently filed suits in the Los Angeles Federal district court against the Southern Pacific Railroad Company, the Southern Pacific Land Company, and two New York trust companies to recover 400 acres of land near Goffs, California, granted to the railroad in 1866 as agricultural land, and since identified as mineral bearing. The land is alleged to contain gold, silver, lead, tungsten, coal, iron and other minerals. Its potential value is placed at upwards of $3,000,000.

The trust companies named as co-defendants are the Central Trust Company and the Equitable Trust Company.

Federal attorneys said that the suits are part of the Government's legal campaign to recover western mineral lands granted to the railroads in the belief that they were agricultural and non-mineral bearing.

Youthful Prospectors In Idaho

With the same initiative that they have shown along other lines of industry, boy scouts of Wallace, Idaho, are going in for mining, to acquire a practical knowledge of that business. On some open ground north of Osburn scouts of a Wallace troop have staked out two claims, the "Lucky Scout" and the "Good Turn." Assessment work will be done by the boys each year, and the troop will be partners in the mine if it turns out a producer. It is expected that much more than the annual assessment work will be accomplished, as the boys are eager to make a mine and will push the work as rapidly as possible.

Oil Companies Protest Storage Tax

The Midwest Refining Company has filed an injunction suit in the District Court at Casper, Wyo., to prevent placing oil held in storage on the tax assessment rolls. Tax notices totalling over $200,000 were previously sent out by commissioners of Natrona County to the Midwest Refining Company, the Sinclair Oil Purchasing Company and others having oil in storage.

The companies contend that the oil was taxed when produced and is not subject to further taxation for that reason.

Company Officials Should Reduce Their Salaries, Says Colorado Industrial Commission

Acting on the recent decision of employes of the Colorado Fuel and Iron Company, and other companies to accept a wage reduction, the Colorado Industrial Commission has urged officials of coal mining companies taking this action to reduce their own salaries in proportion. In the order declaring wage reduction for miners justified in the face of present conditions, the commission says: "The commission feels that in all fairness to the lower paid employes, the higher salaried employes of the companies should voluntarily insist on a proportionate decrease in their own salaries."

Practically every operator in the state has notified the commission of a reduction to the 1917 scale.

Herbert E. Curran has been named a member of the Colorado Industrial Commission by Governor Morley to succeed William I. Rielly who has served as a member for the last six years. Mr. Curran has been secretary of the commission for the last four years.

Union Seeks to Curtail W. Va. Production, Says George Wolfe

The present situation in the coal industry is not a question of union or non-union, says George Wolfe, secretary of the Winding Gulf Operators' Association, but a case where the miners of the Central Competitive fields, led by John L. Lewis, are seeking to curtail the production of West Virginia, which produces one-fifth of the nation's best coal.

Central Pennsylvania 70 Percent Non-Union

B. M. Clark, president of the Central Fennsylvania Bituminous Operators, states that approximately 70 percent of the coal from the central Pennsylvania district is being mined non-union. At the time the Jacksonville Agreement was signed practically 95 percent of this district's output was mined on wage rates established by that agreement.

United Mine Workers local No. 4009 at the mines of the Bethlehem Steel Company near Shinnston, Pa., recently surrendered its charter and asked for a conference with officials of the company to negotiate a new wage scale.

New Breaker at Lansford, Pa.

It is claimed that the new breaker being erected in the Lansford, Pa., region, by the Lehigh Coal & Navigation Company will be the largest in the anthracite field. It will handle the output of three mining slopes.

Coal River Collieries Still Non-Union

The coal mines of the Brotherhood of Locomotive Engineers are still being run non-union under a cooperative plan, and according to Warren S. Stone, president of the Brotherhood, they are progressing very satisfactorily.

There has been no change of policy by the management following a number of conferences with the United Mine Workers, who are seeking to bring about operation of the mines on a union basis.

All of Pittsburgh Coal Co's Union Mines Closed

All of the Pittsburgh Coal Company's union mines are now closed down indefinitely, according to officials, who say that coal cannot be produced at the present high union wages and sold in competition with southern non-union coal except at a heavy loss.

In a letter to the mine workers in the employ of the Company, T. M. Dodson, vice-president, said that the company is endeavoring to bring about a change in conditions that will make possible the continued working of the mines, and that the company feels that the 1917 wage scale would go a long way toward giving the men steadier work and higher earnings.

Since last fall the Pittsburgh Coal Company has had 18 of its 54 mines in operation. Recently it announced the permanent abandonment of 16 of the remaining 36 idle mines.

Dark Hollow Mine Reopens Under 1917 Scale

Miners employed at the Dark Hollow mine of the Pittsburgh Coal Company of Ohio returned to work recently under the 1917 scale. The resumption of work was brought about by the petition of the men that they be permitted to return under the old scale.

Mines in Henryetta District, Oklahoma, Closed

Coal mines in the Henryetta district of Oklahoma have been shut down since April 1. Miners refused to accept a reduction to the 1917 wage scale, which the operators contended was the only way to meet competition with fuel oil.

There are 42 mines in this district which afforded employment to more than 4,000 miners.

Pumps Mine Drainage Into 175-Foot Well to Avoid Stream Pollution

The problem of disposing of sulphur water from the mines of the Indian Creek Coal and Coke Company of Pennsylvania in compliance with the order of the State Supreme Court, prohibiting its drainage into Indian Creek, a fresh water mountain stream, has probably been solved.

The company drilled a 5-inch well, 175 feet deep, and pumped its drainage of sulphur water into it. At no time has the water come within 10 feet of the top, despite the fact the 500 gallons a minute have been emptied into the well. There has been no indication that it has found an outlet in Indian Creek.

Alabama Mining Institute

Officers of the Alabama Mining Institute have been reelected for another year. Frank Nelson, Jr., is president, George F. Peter, vice-president, and James L. Davison, secretary-treasurer.

Among the activities of the Institute at present is the promotion of safety in the Alabama mining fields and the improvement of sanitation and health in Alabama towns. In this work the Bureau of Mines and the Joseph A. Holmes Safety Association is cooperating. Twenty-four of the 132 chapters of the Safety Association are in Alabama.

Hugh Morrow Heads Sloss-Sheffield Steel

Hugh Morrow, formerly operating vice-president of the Sloss-Sheffield Steel and Iron Company, has been elected president to succeed the late John W. McQueen, who died in New York, April 19.

Mines Merge in Park City District, Utah

The Fark Utah Mining Company, Park City Mining & Smelting Company, Ontario Silver Mining Company, and the Daly Mining Company, of the famous Fark City district of Utah, have been merged. The total holdings comprise 4,306 acres. The properties have paid $31,095,136 in dividends and have produced over $125,000,000 in metallic wealth.

Blast Furnaces on the Pacific Coast

Skilling's Mining Review reports that Seattle men are investigating the feasibility of establishing blast furnaces on Puget Sound. William Pigott, head of the Pacific Coast Steel Company, is expected to take the leadership in the solving of problems that confront the establishment of a complete and self-contained iron and steel industry. These problems relate chiefly to competition, domestic and foreign.

Decision Rendered on Nevada Bullion Tax

Judge F. T. Dunn, at Tonopah, Nev., recently rendered a decision which removes the uncertainty that Nevada mining companies have experienced in computing their bullion tax.

The law provides that the bullion tax shall be computed on "net proceeds." Judge Dunn ruled that actual costs of

extraction, transportation, reduction, or sale only could be deducted. Depreciation, taxes, insurance, construction costs, and maintenance of offices outside of the state are classified as incidental or indirect costs, and are therefore not deductible.

The decision was rendered in a test case brought by the Tonopah Extension Mining Company.

South Dakota Aluminum Deposits

It has been predicted that South Dakota will soon rank as one of the great aluminum producing states of the country. J. C. Kirckham, state bridge engineer of South Dakota advocates the building of a dam across the Missouri river near Mobridge for hydro-electric power to develop aluminum from the shale along the river. He claims that the clays and shales of that state have about 320 pounds of metallic aluminum to the ton.

Standard Oil Men Inspect Oil Shale Plant

Representatives of the Standard Oil Company of Indiana recently made a thorough inspection of the Catlin Shale Products Company plant near Elko, Nev. In company with Fred Buick, one of the Catlin engineers, they made a complete examination of the process machinery and asked questions concerning its workings, and expressed surprise at the extensive experimentation that has been carried on by R. M. Catlin and his associates.

Assigned Car Case Argued

Argument was heard at Philadelphia recently in the combined suits of nearly 100 railroads, private industrial corporations and public service companies for the annulment of the Interstate Commerce Commission order requiring privately owned coal cars to be counted as part of car supply for pro-rating among all mines in time of emergency.

The Central Pennsylvania Coal Producers Association and other independents have joined with the commission in defense of the order, which was to have become effective March 1, last.

A special court in equity is hearing these suits in order that the matter may be expedited to the United States Supreme Court for an early decision.

State Mine Rescue Meets

Preliminary to the annual First Aid and Mine Rescue meet to be held at Springfield, Ill., in September, state meets have been arranged at Pittsburgh, Kans., June 13, and Zanesville, Ohio, July 18.

ST. JOE LEAD EXPANDS GROUP INSURANCE

BY expanding its group insurance program, St. Joseph Lead Company, whose executive offices are located in New York and mining and railroad properties in Missouri, has enabled 2,200 of its own employes and those of affiliated companies to increase their protection by $2,200,000, bringing the total in force to approximately $10,000,000.

Adoption of this additional insurance plan is simply another step in the program inaugurated by St. Joseph Lead for the general benefit of its employes, which has borne fruit not only in the installation of a pasteurization plant, up-to-date sanitary arrangements, and in the development of the best possible working conditions for its employes, but also in the establishment of a comprehensive pension system whose entire cost is borne by the company. The pension plan, as well as the additional and original group insurance programs, was underwritten by the Metropolitan Life Insurance Company.

Altogether, more than 4,000 employes of St. Joseph Lead and affiliated companies, including those of the old Federal Lead Company, acquired by St. Joseph Lead in 1923, are insured under these group plans. The affiliated companies are the Missouri Illinois Railroad Company, Mississippi River & Bonne Terre Railway and the Bonne Terre Farming & Cattle Company.

The first group contract was taken out more than five years ago, and during the period elapsed since then, the insurance company has paid in claims more than $200,000. Under the original plan, employes with at least six months service to their credit were given protection, without cost to them ranging for an individual from $500 to $2,000. When the lead company in April, 1923, and April, 1924, extended its offer of additional insurance, the plan was made cooperative, with employer and employes jointly paying the premiums. This plan made available to each contributing employe $1,000 insurance over and above the amount to which he was entitled under the original contract. The provisions of the second additional plan, just become effective, are similar to those of the first.

In announcing the new plan to employes, Clinton H. Crane, president of St. Joseph Lead Company, concluded as follows:

"There is nothing compulsory about this plan, but it is believed to provide a simple and economical method whereby eligible employes desiring to do so may substantially increase their total insurance."

BRIGHTER FUTURE FOR BITUMINOUS INDUSTRY

(*Continued from page* 283)

gradually working out a solution of its own troubles in accordance with the traditional principles of American independence and enterprise, and that the dawn of a brighter day is already clearly visible.

I want to close by reiterating and making more emphatic my protest against governmental intervention. I base my opposition not so much on the rights of bituminous coal operators to the management of their own property as on the broad principle that, taking the situation over a period of years, society as coal consumers has no ground for real complaint, and that in the long run no good, but, on the contrary, serious and lasting social loss would result from attempts to meddle with the delicate mechanism which through the interplay of the forces of supply and demand is constantly tending to bring about such industrial adjustments as will be most advantageous to society.

LOCOMOTIVE HAULAGE

(*Continued from page* 305)

varying conditions with which the engineer must struggle to arrive at the most satisfactory and efficient solution.

Locomotive haulage, as it pertains to mining operations, is closely allied to the same subject in railway operations throughout the United States.

The American Railway Engineering Association was formed for the advancement of knowledge pertaining to the scientific and economic location, construction, operation and maintenance of railways. Its action is recommendatory and not binding upon its members. Meetings for the reading and discussion of reports and papers are held, which are published together with the discussion. I am simply mentioning this for the information of those who would like to investigate this question further and can do so through the publications of the American Railway Engineering Association.

I take pleasure in acknowledging my indebtedness to Messrs. F. W. O'Neil, H. B. Oatley, E. T. Mulcahy, E. Bachman and H. R. Sadd, who have at different times assisted me in matters respecting this subject, which is reflected in this article.

As a part of its contribution to a new enterprise for the purpose of producing, from native ores and by domestic labor, a certain proportion of its home needs in the way of iron and steel articles, the Rumanian state has pledged the output of its iron mines at Huniedoara and Cujar.

WITH THE MANUFACTURERS

Deepest Mine Locomotive Installations

What is probably the deepest mine locomotive installation in the world is a unit in service on the thirty-first level of the Village Deep mine in South Africa, 6,300 feet below the surface. The locomotive is a 6-ton, 30-inch gauge, 2,400-pound unit.

Two batteries are used, this arrangement making it possible for the locomotive to be in almost constant service. One battery is in use while the other is being charged. Both locomotive and charging equipment are of General Electric manufacture.

Link-Belt Standardizes Stock Chain Drives

Link-Belt Company, of Indianapolis, Chicago and Philadelphia, has just announced that after many years of work and study of the problem of standardizing and manufacturing silent chain drives for stock, it has placed in operation a new plan by which complete lines of silent chain drives of from one-quarter to 10 horsepower, in practically any reduction from 1 to 1 to 7 to 1, are now available for immediate delivery, by distributors located in many principal cities of this country.

Back of these distributors will be immense stocks carried in reserve in the warehouses of the company's factories at Indianapolis and Philadelphia.

The stock drive chain is of the same high standard of quality as those that are built for special application. The patented bushed joint construction is the same in the standard stock drive chains as it is in the standard Link-Belt silent chain used for the past 20 years for industrial drives. Distributors are being appointed as rapidly as it is possible to secure the type which will assure Link-Belt service.

200-Foot Dorr Clarifiers Used As Pre-sedimentation Units In Water Plant

A recent announcement by The Dorr Company states that four 200-foot Dorr Clarifiers are to be used as pre-sedimentation units in the new Kansas City Water Treatment Plant, designed by Fuller and Maitland.

The clarifiers are designed to give three hours' detention to the capacity flow of 100,000,000 gallons per day, and will remove continuously from 80 percent to 90 percent of the suspended matter from the raw Missouri River water.

Although Dorr Clarifiers are operating successfully as sedimentation units in many water treatment plants, the Kansas City installation marks the first occasion that such large units have been installed for this type of work. Two-hundred-foot units have been operating successfully in the mining field for years.

These large units will be of the peripheral drive type, and it is expected that the advantages to be obtain from continuous sludge removal will effect substantial savings in the costs of operating the plant.

The James Black Masonry and Contracting Co. has been awarded the contract.

New American Manganese Steel Foundry At Los Angeles

A new foundry for the manufacture of Amsco manganese steel castings has just been placed in operation at Los Angeles, Calif., by the American Manganese Steel Company. This new plant is the most recently established unit of a country-wide chain of six foundries now owned by this company, the others being at Chicago Heights, Ill., New Castle, Del., St. Louis, Mo., Denver, Colo., and Oakland, Calif. The organization has facilities for producing about 25,000 tons of manmanese steel castings annually, and is the largest manufacturer in this specialized field.

The Industrial Works, Bay City, Mich., manufacturers of locomotive cranes and crane equipment for more than a half century announce the opening of two new district offices, one at 425 Whitney Central Building, New Orleans, La., in charge of John A. Abele, district sales manager, and the other at 843-A Hurt Building, Atlanta, Ga., in charge of John J. Murphy, district sales manager.

That company also announces the appointment of four additional district sales engineers. Douglas J. Calder, Conway J. Neacy and Monroe J. Frankel will have offices at the Chicago district office of the Industrial Works, 1051 McCormick Building, Chicago, Ill., and Chester F. Delbridge will be located at the St. Louis district office, Railway Exchange Building, St. Louis, Mo.

The Austin Company, Cleveland, Ohio, announces the removal of its New York office to the Equitable Building, 120 Broadway. Mr. J. K. Gannett is the district manager of the New York office, and Messrs. A. D. Engle and D. C. Raymond are his assistants.

Announcement has just been made by the Timkin Roller Bearing Company, Canton, Ohio, of the purchase of the physical assets of the Gilliam Manufacturing Company. The production of both Timken bearings and Gilliam bearings will be continued in their respective plants.

The Jeffrey Manufacturing Company, of Columbus, Ohio, just has issued a new catalog on "Equipment for Concentrated Mining," describing the new types of Jeffrey coal-mine equipment designed for concentrated systems of mining, and featuring their "Shortwaloader," a cutter and loader combined. The catalog is beautifully printed and illustrated, and will be sent, upon request to the home office.

Roberts and Schaefer Company, of Chicago, Ill., has recently issued two bulletins, one on "The Pneumatic Process of Cleaning Coal," and the other on "Coal Cleaning, Sizing and Loading Plants." These bulletins are beautifully printed, illustrating and briefly describing a few notable plants designed and built during the last year by this company. One of the bulletins describes the new Marcus tipple and dry-cleaning plant designed and built for the West Canadian Collieries, Ltd., Blairmore, Canada. This is the first plant ever built in Canada for cleaning the smaller sizes of coal with the pneumatic concentrating tables instead of washing machinery as formerly. Another feature of the bulletin is the description of the plant installed at the American Coal Company's property—the Crane Creek Mine at McComas, W. Va. This tipple handles 400 tons per hour of run-of-mine coal and loads lump and large and small egg coal over shaker booms. In connection with this plant is the dry-cleaning plant which cleans 240 tons per hour of nut, pea and fine screenings. Copies of these bulletins may be had upon request to Roberts and Schaefer Company, Wrigley Bldg., Chicago, Ill.

The Hisey-Wolf Machine Company, manufacturers of portable electric machine tools, Cincinnati, Ohio, have issued a new Bulletin No. 107, describing the latest Hisey electric drill, which is equipped with the standard Hisey motor. The Bulletin is illustrated and thoroughly described. Copies may be obtained upon addressing the home office at Cincinnati.

The American Manganese Steel Company, Chicago Heights, Ill., has issued a bulletin on their newly patented Amsco Clark Bridge Type Dipper Front, which they state is a very rugged front with the bottom having a double wall supported by connecting ribs, which in turn form sockets for teeth, thus doubling the strength of the dipper lip. The ribs are so arranged that the front may be equipped with the number of teeth that will give the most efficient digging results. For example, a 2½-yard front has

THE first completely electrified open-pit coal mine in this country is at the kind of material to be dug and the particular features of the operation. The front is made perfectly flat and has the ability of making a smooth, even cut which is so desirable in stripping or digging coal with power shovels, or digging slag.

The **Griscom-Russell Company** has issued a folder on the G-R Multiscreen Filter. This apparatus is designed for the efficient removal of oil, grease, mud, sand and other foreign matter from condensed steam or raw water to be used for boiler feed or manufacturing purposes. Copies of the leaflet No. 400 can be obtained by writing the Griscom-Russell Company, 90 West Street, New York City.

A new **Link-Belt** Book descriptive of "Clean Water" Intake Screens has just been published.

The forepart of the book is given over to a brief description of the general construction of the Link-Belt Screens, and follows with more than 30 elaborate views of various installations.

Copies of this book No. 752 will be mailed free upon request to Link-Belt Company, Indianapolis, Chicago or Philadelphia.

The **Hill Clutch Machine & Foundry Co.**, Cleveland, Ohio, has just issued Bulletin No. 112 on the patented "Cleveland Type" Collar Oiling Bearing.

The positive oil feed and distributing system immediately starts a forced oil circulation. A heavy unbroken oil film is maintained which lifts the shaft free from all metal contact. Naturally there is no wear, and being a truely film born bearing the efficiency is extremely high. The bearings require attention only a few times a year, when fresh oil should be added. They are capable of withstanding exceptionally heavy pressures, due entirely to the oil film.

The "Cleveland Type" Bearing is supplied in all styles of rigid and ball and socket mountings, Adjustable 4 Ways.

The Hill Clutch Machine and Foundry Company, Cleveland, Ohio, manufacture this bearing exclusively and will be glad to forward printed literature to anyone interested in the subject of efficient and economical line shaft bearings.

FIRST COMPLETELY ELECTRIFIED OPEN-PIT COAL MINE

THE first completely electrified open-pit coal mine in this country is at the newly made town of Colstrip, approximately 35 miles south of Forsyth, Mont. The coal bed, about 180 acres in extent and 25 feet deep, is owned by the Northwestern Improvement Company and is being worked by Foley Brothers, general contractors, of St. Paul, Minn. The coal is subbituminous, with a heat content of 11,000 b.t.u. The output of the mine will be used for the locomotives of the Northern Pacific Railroad in Montana.

As a result of a thorough study of the circumstances, it was decided to utilize electricity in mining the coal. An extension of the Montana Power Company's 55,000-volt transmission line was made and complete electric equipment was purchased for stripping the overburden from the coal, mining the coal itself and hauling. This equipment consists of a Marion Model No. 360 electric shovel, with a 155-foot boom and six-yard bucket, used as a drag-line excavator for stripping and equipped with General Electric drive and Ward-Leonard control; a Bucyrus Model No. 175-B coal loading shovel with General Electric direct-current drive and two 60-ton electric storage-battery locomotives. The locomotives are the largest storage-battery units which the General Electric Company has built. They are equipped with Exide Iron Clad lead storage batteries of a special size and include a General Electric motor generator in the cab of each for charging.

During the time spent at the shovel while the cars are being loaded, a flexible cable, running from a bank of transformers on the shovel, is plugged into the locomotive for charging. While coal is being mined from one strip, the overburden is being removed from the next and is cast into the excavation resulting from the removal of the coal.

REAL ISSUE IN COAL INDUSTRY

(*Continued from page* 272)

President Grant once said with reference to sound money payments, "the way to resume is to resume." The way for the coal operator to meet this great issue is to lay down the rule that hereafter he will sell no coal except at a profit.

If the industry, as a whole, after struggling with this problem since 1910, finds itself unable to solve its problems —if the government stands with the club of the Sherman Anti-Trust law at the portal of a sane solution of coal problems and says you shall not, as an industry, agree upon a sane economic management of your business—then it is up to each individual coal operator to solve his own problems and the problems of the industry, by refusing further to produce coal which he cannot sell at a profit. This solution can be applied immediately, effectively. That is the real issue and there is no other practical remedy.

SOUTHERN INDUSTRIAL EXPOSITION

(*Continued from page* 279)

and minerals. The port of New Orleans was represented by a gigantic relief map showing the entire city and its environment, the miles of port development and the new ship canal to Lake Ponchartrain. The map represented a scale of one inch to 200 feet and formed an impressive setting for the city's resources.

The good roads program of Maryland was indicated by working models of quarry, stone crusher, and road construction, accompanied by pictures and maps. One of the striking features of the Maryland exhibit were massive paintings of Baltimore, immediately after the fire, and now.

North Carolina's display centered around the Asheville district, with marble, mica, wood carving and textiles forming the outstanding features.

South Carolina concentrated on hard and soft woods, brick, tapestry, and an amazing variety of textile products which compare favorably with those of any other textile center in the world. Of special note was the Winnsboro granite exhibit, a slab of granite 3 x 6 ft. and only 1-3/16 in. in thickness, an achievement rarely accomplished with this material, and of especial value to the state because of the seamy nature of some of its granite deposits.

Virginia dealt largely in pictures and statistics, with a few steel and paper exhibits.

Florida's space was devoted to real estate and tourist, with a few fruit, candy and preserve counters. It is to be greatly regretted that the great clay and gravel, phosphate rock and coquina stone, ilmenite and rutile, diatomaceous earth and tripoli, fullers earth and peat deposits of that state could not have given a measurable idea of their importance.

Georgia was represented both by city and by industry. The power company exhibits referred to above, constituted a major portion, interwoven as they are with industrial development.

Kentucky was represented by the unique needlework of one woman.

It will be seen therefore that creditable as was the exposition much remains to be done to make it adequately representative of the whole South. If all the textiles, all the minerals, all the fruits and farm products, all the lumber and paper products, the summer and winter resorts, could be grouped by their natural association, rather than by states, a much more impressive display would result.

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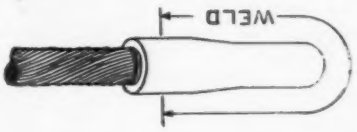

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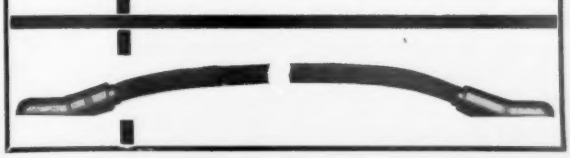

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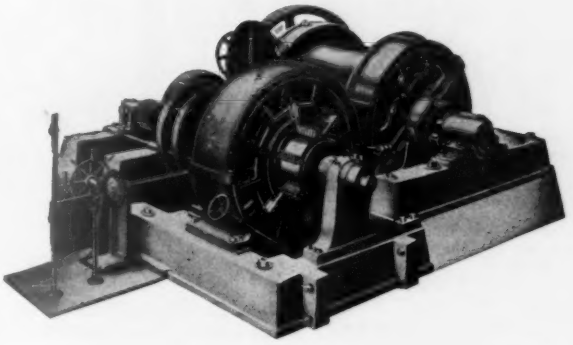

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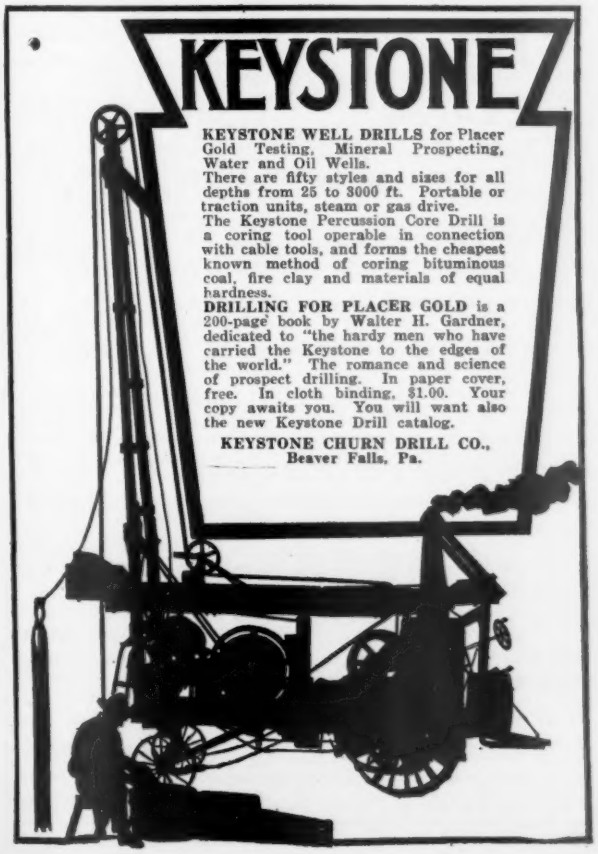

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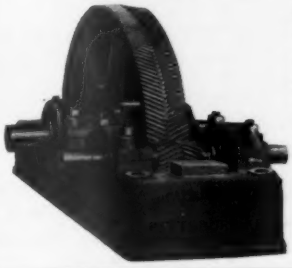

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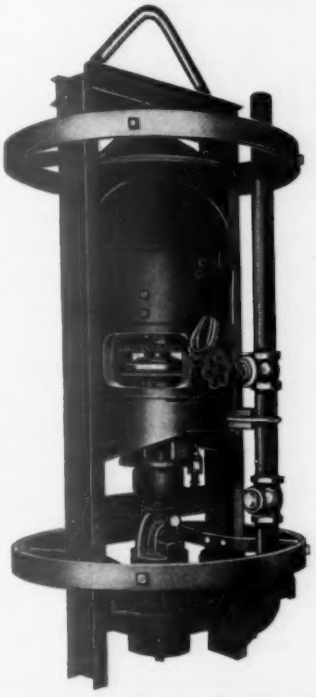

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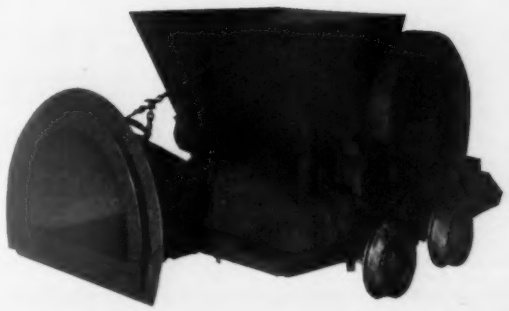

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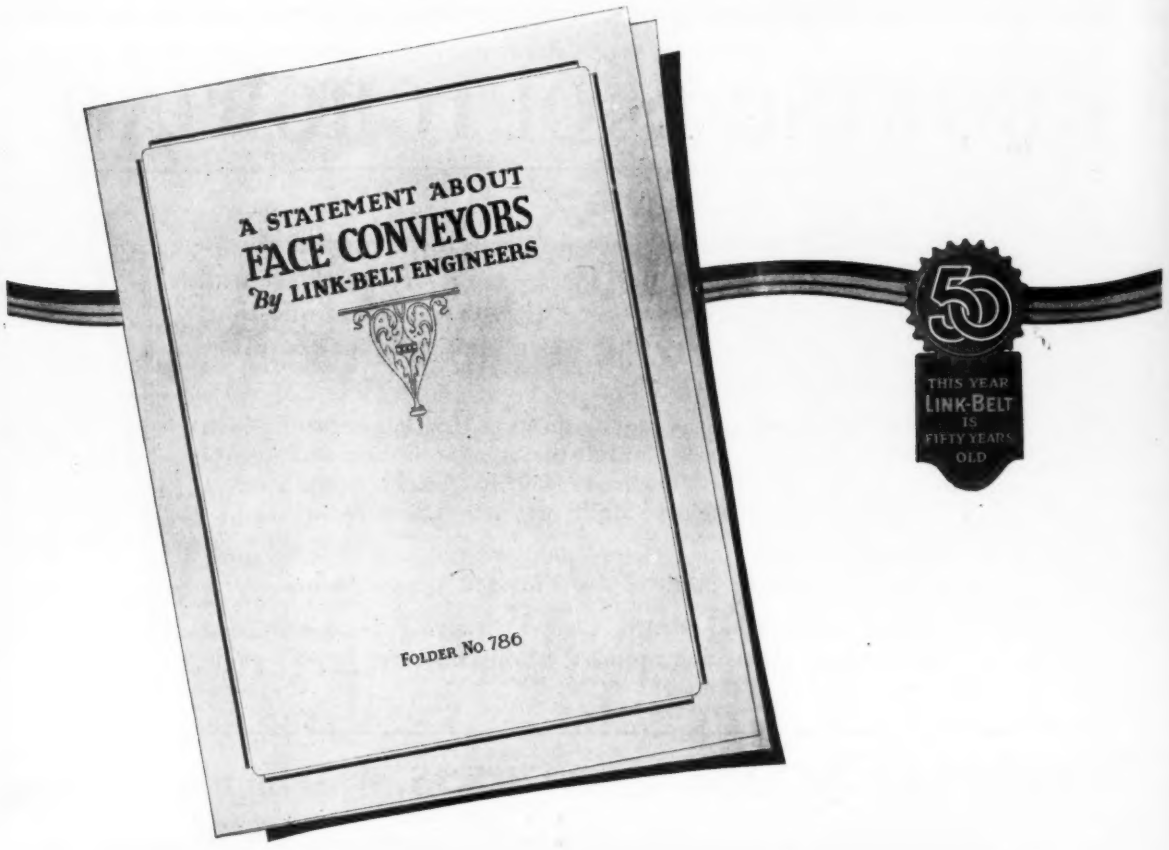

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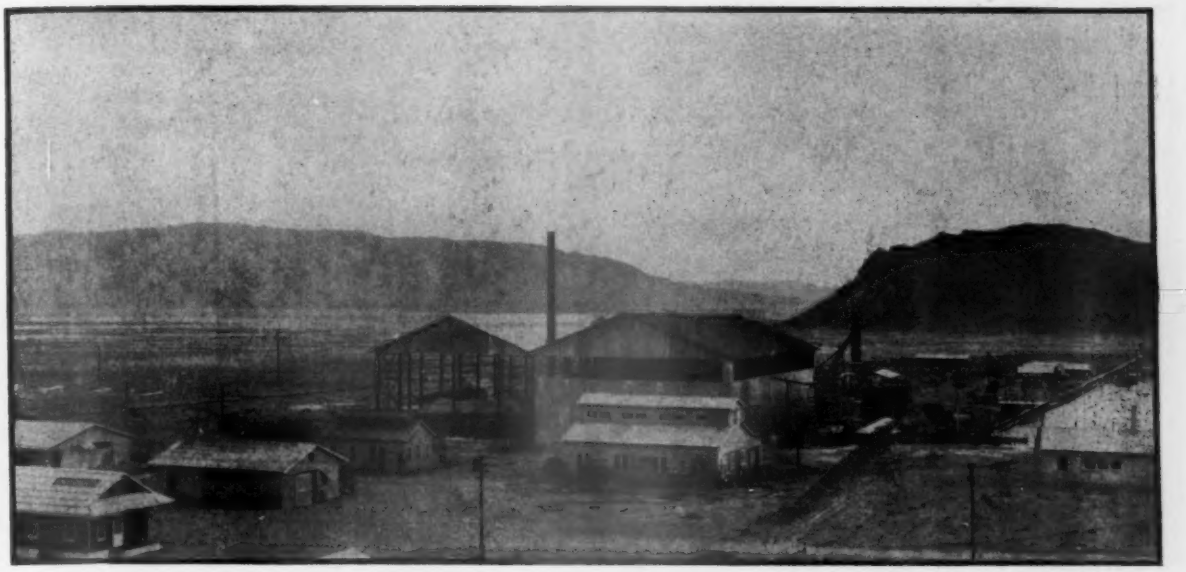

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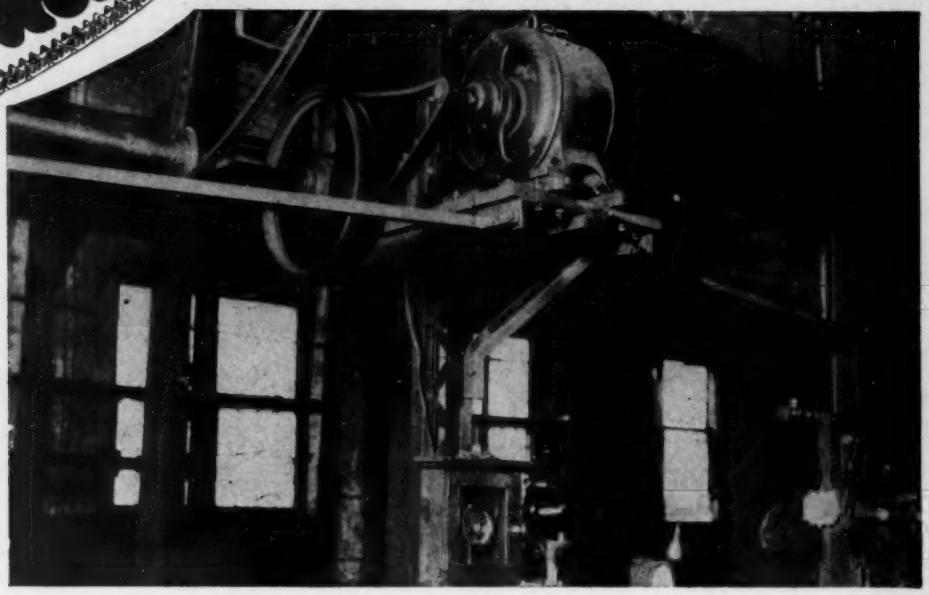

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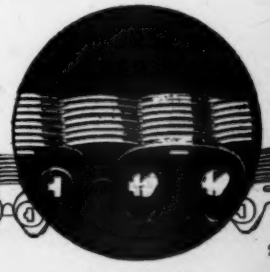

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